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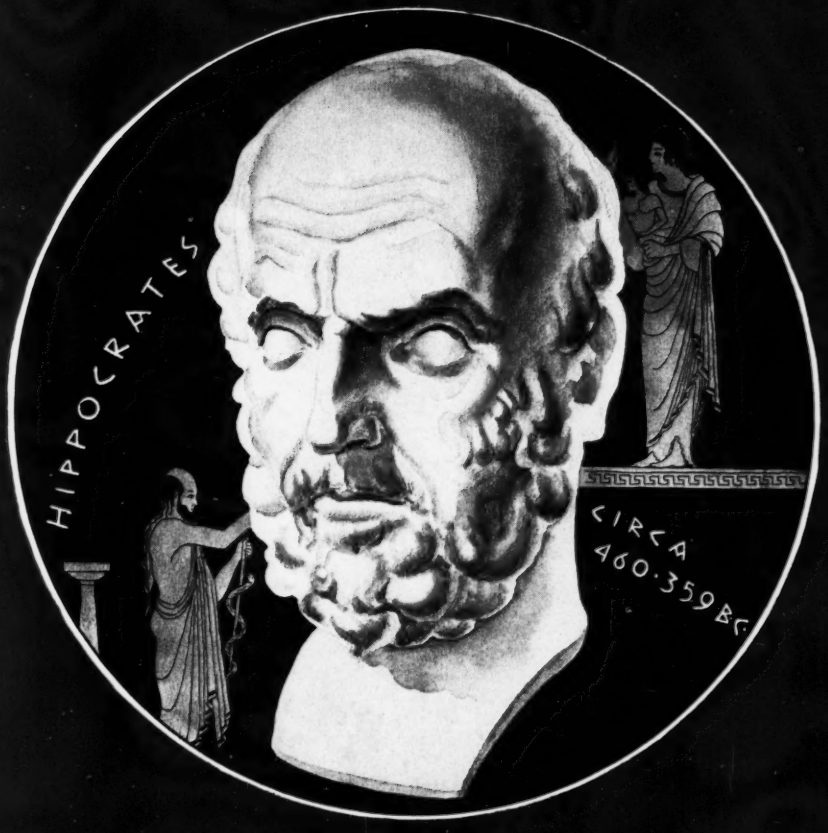

AUGUST, 1934
Vol. 40 No. 8

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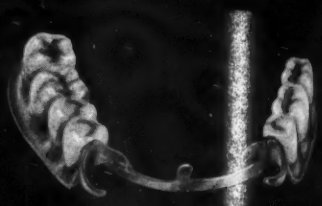

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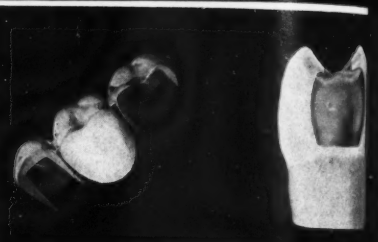

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The DENTAL DIGEST

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VOLUME 40 — *August, 1934* — NUMBER 8

Cleft Palate - - - - - - - - - - - - - - - 262
John J. Fitz-Gibbon

Microscopic Technique for General Dental Practice - - - 267
Fred Carmosin, D.D.S.

Fixed Bridge Technique—One-Piece Casting - - - - - 268
C. P. Janicki, D.D.S.

Letters to The Editor - - - - - - - - - - - - 271

Organization and Operation of the Industrial Diagnostic Service of the Chicago Dental Society - - - - - - - - 272
Stanley D. Tylman, A.B., D.D.S., M.S.

About Our Contributors - - - - - - - - - - - 275

Electrosurgery in the Oral Cavity - - - - - - - - 276
Joseph A. Hopkins, D.D.S.

The Editor's Page - - - - - - - - - - - - 280

The Dental Scene - - - - - - - - - - - - 281

Dental Materials: A Didactic Subject - - - - - - - 282
Maurice A. Goldberg, D.D.S.

Postoperative Canal Filling in Apicoectomy - - - - - 285
M. Hillel Feldman, D.D.S.

Necrosis Following Infiltration - - - - - - - - - 286
Don E. Woodard, D.D.S., M.S.D.

EDWARD J. RYAN, B. S., D. D. S., Editor

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CLEFT PALATE

JOHN J. FITZ-GIBBON
Holyoke, Massachusetts

IT IS our mission, as members of the dental profession, to create in the minds of the American public an interest in the correction of cleft palate, an interest equal to that manifested in crippled bodies, defective sight, and other congenital and acquired deformities. Although all of us recognize this deformity, too few realize the mental torture, the humiliation, and the misery which it engenders. According to conservative statistics, one in every 2,200 persons is born with a cleft palate; this estimate does not, of course, include the number of acquired cases. It is our purpose in this article to enumerate the many types of cleft palate presented for treatment and to describe an effective method of correction.

Congenital Cleft Palate

The congenital cleft palate is a division of the roof of the mouth, beginning at the posterior border of the soft palate. Although it may be simply a bifurcation of the uvula, it more often includes the soft palate and may also extend anteriorly through the hard palate in varying degrees of length, at times including the whole structure. In the most extreme cases, the cleft extends through the alveolus and the lip at one or both sides of the premaxilla.

Type Cases

The first is the cleft of the soft palate—type one (Fig. 2); the second, the cleft of both soft and hard palates—type two (Fig. 3); in the third, the division of the palates extends forward through the alveolar ridge causing a single harelip—type three (Fig. 4); in the fourth, the cleft includes the soft and hard palates and extends through the ridge at each side of the premaxilla causing a double harelip—type four (Fig. 5); the fifth, the edentulous type, is one of the most difficult to correct and is frequent in all types of cases; Fig. 6 illustrates an edentulous case of the third type.

Postoperative types present several forms of which the following are typical: Fig. 7 illustrates the complete failure of palatal surgery with the breaking down of the entire structure; Fig. 8, the partial closure of a type 3 cleft, showing the short immobile soft palate; Fig. 9 illustrates the result often present after the Brophy operation, constricted palatal arch; Fig. 10 shows the usual picture of many palate repairs leaving one or more perforations; Fig. 11 illustrates a most desirable surgical result; nevertheless, the patient has been left with a foreshortened soft palate and still requires an appliance to make up a deficiency in structure; Fig. 12 shows a postoperative type 3 cleft with the teeth removed and mouth prepared for an edentulous appliance.

Acquired Cleft Palate

Acquired palate deformities may be classified under four types: injury, disease, surgical operation involving the loss of bony structure, and surgical operation involving the loss of soft structure. Fig. 13 shows a gun shot injury caused by a bullet entering the right cheek, passing through the hard palate, and out of the left side, tearing a groove through the palate process, and leaving the maxillary sinuses open; Fig. 14 illustrates an unusual type associated with tertiary syphilis; Fig. 15, the destruction of the bony structure due to carcinoma, and Fig. 16, the surgical removal of the soft palate.

As a point of interest and to illustrate that cleft palate is not confined to the human being, the model of a spaniel with a unilateral cleft of the soft and hard palates is included (Fig. 17).

Correction of Cleft Palate

Attempts to correct cleft palate speech have led to the construction of several types of appliances. We are all familiar with the solid obturator (Fig. 18), for example, the main principle of which was to block the orifice with a mass of vulcanite of sufficient thickness to preserve contact at all times with the divided velum. But with the functioning of the levator-palatine muscles, a mass of material is left extending into the oral cavity and when these muscles are in repose, the same mass extends into the naso-pharynx. Then too, this type of appliance is not applicable to the postoperative case.

There are also several kinds of hinged obturators (Fig. 19). Although the construction of this type

Fig. 1—Extra-oral: intra-oral relationship of the cleft palate.

Fig. 2—Type 1, cleft of the soft palate.

Fig. 3—Type 2, cleft of both soft and hard palates.

Fig. 4—Type 3, division of palates exe tends forward through the alveolar ridg causing a singie harelip.

Fig. 5—Type 4, cleft includes the soft and hard palates and extends through the ridge at each side of the premaxilla causing a double harelip.

Fig. 6—Edentulous case of the third type.

Fig. 7—Complete failure of palatal surgery with the breaking down of the entire structure.

Fig. 8—Partial closure of a type 3 cleft, showing the short immobile soft palate.

Fig. 9—Frequent result after the Brophy operation, constricted palatal arch.

Fig. 10—Usual picture of many palate repairs leaving one or more perforations.

Fig. 11—Desirable surgical result.

Fig. 12—Postoperative type 3 cleft with the teeth removed and mouth prepared for an edentulous appliance.

Fig. 13—Gun shot injury caused by a bullet entering the right cheek, passing through the hard palate, and out of the left side, tearing a groove through the palate process, and leaving the maxillary sinuses open.

Fig. 14—Unusual type associated with tertiary syphilis.

Fig. 15—Destruction of bony structure due to carcinoma.

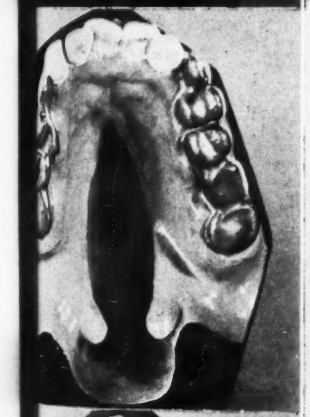
Fig. 16—Surgical removal of the soft palate.

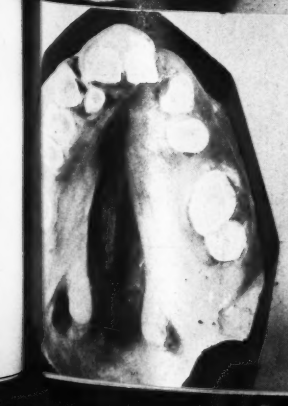
Fig. 17—Model of a spaniel with a unilateral cleft of the soft and hard palates.

Fig. 18—Solid obturator.

Fig. 19—Hinged obturators.

Fig. 20—Kingsley velum appliance.





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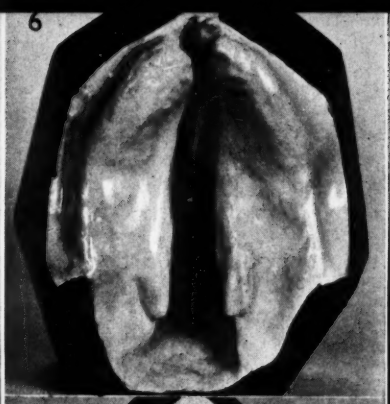

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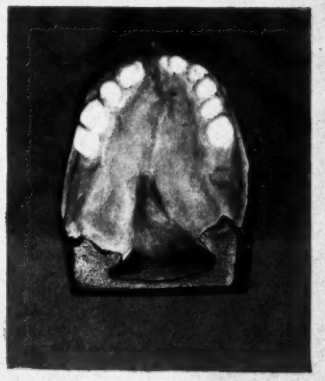

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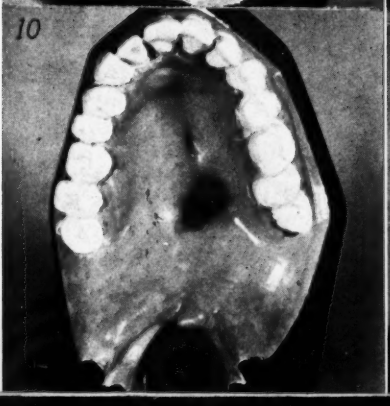

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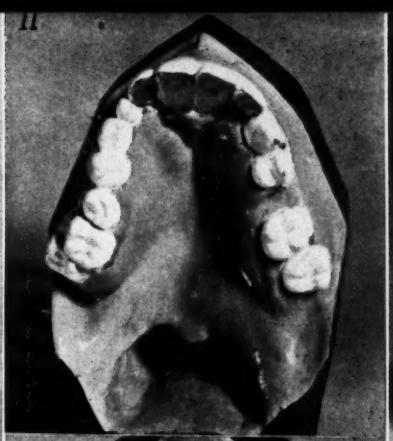

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of appliance was based on normal palate function, an essential factor was overlooked; that is, the marked difference in shape and size of the constricted pharyngo-palatine arch in high and low position. Furthermore, the arc of the posterior wall is not fixed; it increases or decreases in curve as the head is brought forward or thrown back. This also is a condition for which the hinged obturator does not provide.

The Kingsley velum (Fig. 20) has a set technique for construction, can be used for all types of cases, and functions well if properly made. This appliance consists of a soft vulcanite piece attached to a palatal plate, with a lip engaging the divided velum; for postoperative cases, a single soft vulcanite attachment without the lip. A soft rubber appliance, however, is always open to criticism from a hygienic point of view, for rubber soon becomes porous, absorbs fluids of the mouth, and is obviously unsanitary.

I have perfected, for my own use, as well as for the use of others, an appliance which has served all types of cases with equal success and which obviates the deficiencies of the appliances just described. It is an all metal appliance, preferably of cast gold, absolutely clean, and readily sterilized, consisting of a palatal plate corresponding to the normal hard palate, a tail-piece corresponding to the normal soft palate in repose, and a bulb at the end of the tail-piece by means of which palatal function is simulated (Fig. 21).

TECHNIQUE OF CONSTRUCTION

1. For the construction of this appliance (the one to be described here in detail is for a type 3 cleft), a study model of the mouth must be made first, care being taken to duplicate all the structures possible, including the posterior wall (pharynx).

2. The impression should extend upward sufficiently on the posterior wall to take in a protuberance always in evidence, the tubercle of the atlas.

3. A tray is fitted to the palatal arch and a modeling compound core impression of the cleft is taken.

4. This core impression is carried to and from the mouth, added to and trimmed off (so as not to lock it in the cleft) until there results a well-defined impression of the existing structures. The impression should extend back far enough to include the pharynx.

5. After this core impression has been chilled and replaced in the mouth, a large tray previously fitted to the dental arch and containing soft modeling compound is carried to the mouth, thus completing the impression (Fig. 22, A and B).

6. When the complete impression has been removed, the core is placed in proper position and a model is run. Since the soft structures were pushed upward under compression, the model must now be corrected to duplicate these structures in repose.

7. A base plate carrying a tail-piece which covers the divided velum is made to fit the model. This base plate is carried to the mouth so that the tail-piece may be adjusted to the normal arc of the soft palate in repose.

8. The base plate is then returned to the model (Fig. 23) which is corrected to the position indicated by the base plate. The uvulae are carved so that we have as accurate a reproduction of the structures as possible (Fig. 24, corrected model).

9. For the working model, an elastic impression material may be used, but with extreme caution, for it is at times a serious matter to force plastic material up into the naso-pharynx when taking this impression. We are concerned with the detail of the existing hard palate structure as well as accurate relationship and form of the teeth; not with the structures above the palate process; therefore it is not necessary to force material into the nasal cavity.

10. This model, made of investment material—or of stone, if a master mold technique is used—is corrected in the same manner as the base plate, as previously described for the study model; the base plate is again placed on the model and investment or stone is poured in behind it on the model.

11. This model serves for a casting of the palatal plate with a tail-piece lying over the divided velum in repose. This model may be scraped slightly so that the tail-piece, which is of a width sufficient to cover the divided velum completely, will be under a slight pressure. The approximate normal junction line of the uvula and soft palate determines the length of the tail-piece (Fig. 25, corrected master model for palatal plate, clasps, and tail-piece).

12. The palatal plate with the tail-piece and retentive clasps is cast as thin and light as possible, consistent with the size of the appliance.

13. Finally, a wire soldered to the end of the tail-piece, roughly shaped to fit in the constricted pharyngo-palatine arch (Fig. 26, casting with wire soldered to tail-piece), built up with a triangular mass of carding wax, softened and carried to the mouth. The patient must now bend the head forward on the chest and when the appliance is removed, the indentation of a protuberance will be visible on the posterior part of the wax. This is the superior posterior border of the bulb.

Fig. 21—All metal appliance consisting of a palatal plate corresponding to the normal hard palate, a tail-piece corresponding to the normal soft palate in repose, and a bulb at the end of the tail-piece by means of which palatal function is simulated.

Fig. 22—A and B, showing complete impression for study model of mouth.

Fig. 23—Base plate returned to model.

Fig. 24—Corrected model.

Fig. 25—Corrected master model for palatal plate, clasps, and tail-piece.

Fig. 26—Casting with wire soldered to tail-piece.

Fig. 27—Bulb muscle-trimmed and more carding wax applied to disto-lateral corners.

Fig. 28—Plate and bulb removed from mold.

Fig. 29—Wax bulb series, from carding wax bulb to cast bulb.

Fig. 30, A, B, and C—Buccal-lingual clasps and design for types 1, 2, and 3 clefts.

Fig. 31, A—Large type 3 cleft necessitating strut-bar clasp.

Fig. 31, B—Strut-bar clasp.

Fig. 32, A—Postoperative type 2 cleft requiring only a light skeleton palatal plate retained with bar clasps.

Fig. 32, B—Bar clasps.

Fig. 33, A—Postoperative type 4 cleft with excellent soft palate result.

Fig. 33, B—Strut-bar retention.

Fig. 34—Types 3 and 4 require staggered wings extending into the cleft for retention.

Fig. 35—Type 3 cleft with malocclusion.

Fig. 36—Common position of the lateral and cuspid in a type 3 case with no surgical intervention.

Fig. 37—Type 2 postoperative case. Note position of central incisors in bicuspid and cuspid area. Patient has marked infra-occlusion.

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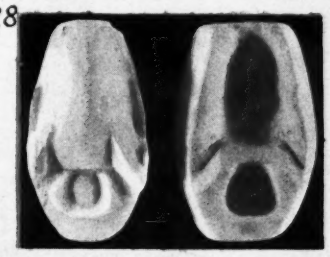

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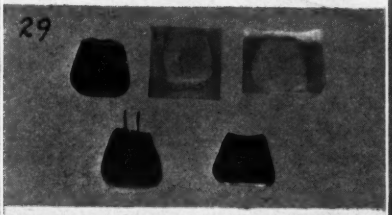

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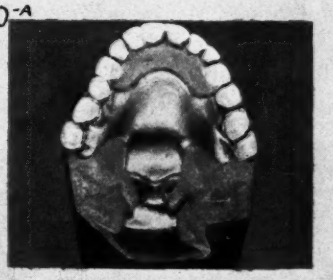

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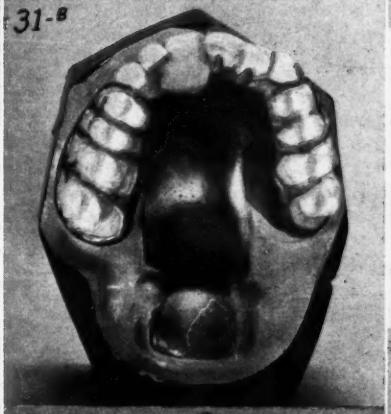

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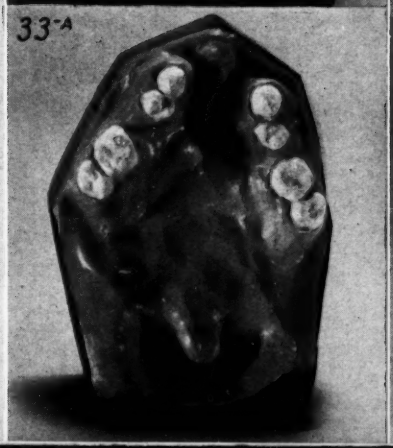

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14. After the wax has been again softened and carried to the mouth, the patient is instructed to swallow several times so that the bulb will be muscle-trimmed laterally by the posterior pillars.

15. More soft carding wax is applied to the disto-lateral-corners of this bulb, softened, again carried to the mouth, and the patient instructed to turn the head from side to side while swallowing. These movements are repeated until perfect adaptation on constriction is obtained (Fig. 27).

16. The plate is then removed from the mouth and a two-piece mold is made, preserving the relation of the tail-piece and wax bulb.

17. The plate and bulb are removed from the mold (Fig. 28) and the bulb impression of both halves of this mold are lined with casting wax, from 20 to 30 gauge.

18. The halves of the mold are placed together and by applying pressure and then separating, the two portions will adhere. When this wax has been removed and the edge sealed, there is an accurate reproduction of the bulb in a hollow wax form. This hollow wax form will have a slight opening where the bulb is attached to the palatal plate.

19. With a soft U-shaped wire, painting investment is worked into this hollow bulb until it is filled; the wire is left in the investment for support.

20. The bulb is now sprued, invested, and cast (Fig. 29, wax bulb series, from the carding wax bulb to the cast bulb).

21. After the hollow casting has been boiled out and the core and wire removed, the bulb is carried back to its proper relation in the mold, together with the palatal plate. At this time, the wire previously soldered to the tail-piece of the palatal plate to hold the carding wax for the impression technique is also removed.

22. The bulb is now soldered to the tail-piece in its proper relationship, care being taken to seal the bulb perfectly. This bulb may be assembled by casting the halves and soldering, but the single casting is more accurate.

The appliance may be retained with buccal-lingual clasps, bar-type clasps or strut-bar clasps. Figs. 30, A, 30, B, and 30, C illustrate buccal-lingual clasps and design for types 1, 2, and 3 cleft. Fig. 31, A, illustrates an extremely large type 3 cleft, necessitating the strut-bar clasp shown in Fig. 31, B. Fig. 32, A, illustrates a postoperative type 2 cleft requiring only a light skeleton palatal plate, retained with bar clasps, Fig. 32, B. Fig. 33, A, illustrates a postoperative type 4 cleft with an excellent soft palate result. Maxillary mandibular relationship in this case necessitated opening the bite 8 mm. and constructing an overlay on the remaining maxillary teeth. By building the case as illustrated in Fig. 33, B, strut-bar retention, it was possible to leave considerable tooth exposure, thus preventing, to a great extent, the usual tooth decalcification which follows tooth coverage. Note that in this case no tail-piece or bulb has been constructed because of the excellent surgical result on the soft palate. Tail-piece and bulb may be added at any time, if necessary. (The patient is now under observation and training). The edentulous, types 1 and 2, also similar postoperative types, may often be retained by using a good denture impression technique. Types 3 and 4 require staggered wings extending into the cleft for retention (Fig. 34). In general, acquired cases require individual study for correction.

The basic principle of this appliance differs from that of the heretofore accepted appliances; with them, an attempt was made to produce tone as a normal person does with a normal palate. This simulation of normal palate action, difficult, if not impossible, of attainment, can be disregarded and normal speech produced by voluntary constriction of the pharyngo-palatine arch on the bulb of the Fitz-Gibbon appliance. The action in producing the palatal consonants is horizontal instead of vertical and involves the gripping of the bulb as in the act of swallowing.

We would not neglect the place of the surgeon in the correction of cleft palate. The closure of the palate is greatly to be desired because the postoperative case will require a smaller and much lighter appliance. Lip and nose deformities should also be remedied. Although it is possible that the discovery of new techniques will render surgical operations more effective, it does not usually follow, with the techniques now in use, that a perfect union of the parts restores or creates normal speech.

In practically all of the postoperative types of congenital palate deformities, we must also turn to the orthodontist. From both an esthetic and phonetic point of view, malocclusion is a more serious handicap for these patients than for the person with a normal palate. Three types of malocclusion are shown. Fig. 35 is a type 3 case. There has been no palatal surgery attempted but a lip repair has been done. Incisors are in torsi-version and the bicuspids are in lingual version. Fig. 36 shows the common position of the lateral and cuspid in a type 3 case with no surgical intervention. Fig. 37 illustrates a type 2 postoperative case. Note position of central incisors in bicuspid and cuspid area. Patient has marked infra-occlusion.

It is the prosthodontist, however, with a thorough knowledge of the existing conditions and a corrective technique for restoring perfect speech, who must answer for the ultimate success or failure of the patient to oc-

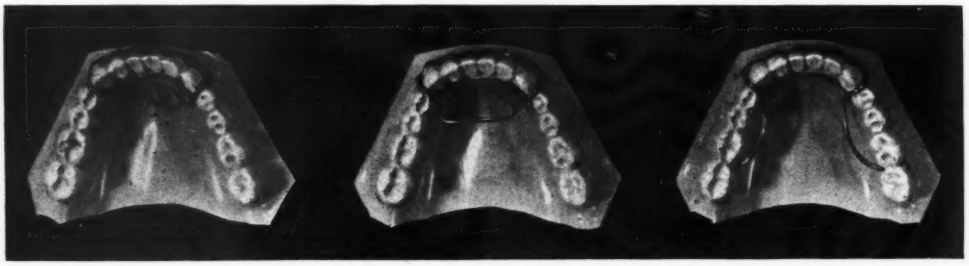


Fig. 38 — Small wire appliances for facilitating new tongue habits.

cupy a normal place in the world. Not only must he strive for a psychologic understanding of the human being with whom he is dealing, he must be a speech correctionist as well.

Speech Training

Assurance of the fact that normal tone can be and has been attained by means of the appliance which the patient uses will do much to arouse his self-confidence. He must acquire new speech habits to take the place of those already formed; he must learn particularly to overcome the effort of the tongue to block the orifice. In order to facilitate the forming of new tongue habits, small wire appliances have been designed and used with success (Fig. 38). The appliance varies, of course, with the individual habit. They are supplementary, retained by cribs, and worn only during speech practice. Because of the natural tendency of the patient with a cleft palate to raise the dorsum of the tongue in an effort to block the orifice and thus to place the tip of the tongue at an abnormally low point in back of the lower teeth and gums, the first appliance among those illustrated has perhaps been most useful. It functions as an inclined plane and keeps the tip of the tongue in a more normal position. Palatograms are also helpful in visualizing tongue positions and placements. Fig. 39 illustrates a nostril dilator which is made of two small wire rings with a U-shaped connection. This, if worn during speech practice, will aid greatly in relieving one of the most common habits of the cleft palate patient—the constriction of the naries. For a resonant tone, a certain amount of air must pass through the nasopharynx. A vocabulary of synonyms for words that the patient finds difficult is an aid in acquiring good speech.

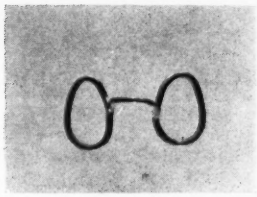


Fig. 39—Nostril dilator.

It is evident that time and patience are the greatest factors in the correction of cleft palate speech. Experience has proved to us, however, that the result obtained will be commensurate with the effort expended.

Hadley Falls Building.

MICROSCOPIC TECHNIQUE FOR GENERAL DENTAL PRACTICE

FRED CARMOSIN, D.D.S.
Philadelphia

Equipment—(1) Microscope with an oil immersion lens of 1.8 mm.; (2) platinum wire loop or a discarded monel-metal needle mounted in a broach holder; (3) glass slides and cover glasses; (4) stains, such as methylene blue, carbolfuchsin, Giemsa's, and Ehrlich-Biondi triple stain; (5) bottle of distilled water; (6) bottle of cedar oil to be used with the oil immersion lens.

Preparation of Slides and Cover Glasses—Slides should be cleaned with soap and water, then dried and heated in the flame of an alcohol lamp, and preserved in alcohol until used.

Preparation of Specimens—1. Smear from Gingival Tissues: (a) Smear is collected with the sterilized platinum loop. (b) Material is emulsified in a drop of sterile water. (c) Make a long thin smear. (d) Dry in air and fix in an alcohol flame.

2. Smear from Sputum: (a) Sputum should contain one or two solid masses. (b) Rub sputum between two slides until the material is broken. (c) By drawing one slide across the other a thin smear is made. (d) Dry in air and fix.

3. Smear from Throat: Use a sterile cotton swab on a wooden applicator. Apply film of the exudate to a slide and proceed as in the case of sputum.

Mounting of Stained Preparation—Mounting of preparations is done in order to preserve color and so that comparative studies can be made of the same patient, or other patients with similar cases.

Use liquid paraffin to mount slide and ring a cover glass with oxyphosphate of zinc, cementing it to the slide.

1654 North Marshall Street.

Method of Staining for Most Smears from the Oral Cavity

1. After fixation of the specimen, the slide is flooded with Löffler's methylene blue for three minutes.
2. Excess stain is washed off under cold tap water for two minutes.
3. All surplus water is removed between folds of blotting paper.
4. Dry in air.
5. Slide is mounted and examined under an oil immersion lens, liquid petrolatum being used.

Method of Staining for Tubercle Bacillus (Ziehl-Neelsen)

1. Prepare and fix a film of sputum as previously described.
2. Drop carbolfuchsin solution, and flame gently until stain steams off the slide.
3. Wash under a tap and place for ten seconds in a 25 per cent solution of hydrochloric acid.
4. Wash well in methylated alcohol until the red color no longer comes away.
5. Rinse in water and stain with methylene blue for thirty seconds.
6. Wash under tap and then dry.
7. Under examination the tubercle bacilli stain red; all other organisms color blue.

Method of Staining Treponema Pallidum (Giemsa)

1. Make up Giemsa's stain by adding 0.035 Gm. of eosin azur in 5 cc. of a mixture of equal parts of glycerin and pure methanol.
2. Dilute this mixture with distilled water in the proportion of 1 to 4.
3. The film, after having been fixed in absolute alcohol, should be stained, the film slide being placed down in a flat bottomed dish for fifteen minutes. The slide rests on thin glass rods.
4. Wash under tap and dry.
5. Under examination *Treponemata pallida* stain reddish purple; the nuclear bodies stain dark red.

FIXED BRIDGE TECHNIQUE
ONE-PIECE CASTING

C. P. JANICKI, D.D.S.
Chicago

THE one-piece cast fixed bridge technique to be described here requires one impression and the completed case is expanded sufficiently to snap into position in the majority of cases. The types of abutments and pontics accepted at present are employed.

Advantages of One-Piece Casting

1. Employs three-quarter, inlay, or full crowns.
2. Eliminates shrinkage, as in contraction of solder.
3. Eliminates danger of moved abutments found in assembled bridges owing to fracture upon removal of plaster impressions.
4. One-piece casting takes minimum chair time.
5. Dark lines on pontics due to backings at incisal or occlusal edge are eliminated.
6. Maximum esthetic appearance, marginal adaptation of abutments, sanitation, and gingival preservation are obtained.
7. Minimum tooth preparation is required.
8. The necessity of tapering from gingival to occlusal is diminished, because of the use of an elastic impression material. There is an advantage in cases in which the tooth has a decided flare especially in anterior teeth where the visibility of gold is objectionable. Although a preparation is made to exclude the labial surface, impression taking is difficult whether direct or indirect methods are employed. In posterior teeth the danger of pulp involvement is diminished by employing a slice preparation (Fig. 1).

The hard and flexible casting golds available at present have sufficient spring to snap into place without the necessity of absolute tapering of the abutment teeth. This eliminates the danger of irritation to pulp tissues.

Impression and Model

The periphery of a bridge tray, into which several holes have been drilled with a number 8 bur, is covered with modeling compound to a depth of about 5 mm. and width of about 3 mm., forming an undercut to retain the elastic impression material (Fig. 2). This type of tray is an aid in cooling, the water coming in direct contact with the elastic impression material.

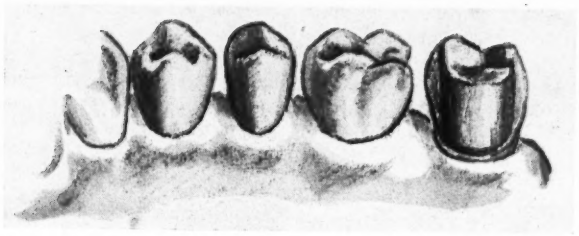


Fig. 1

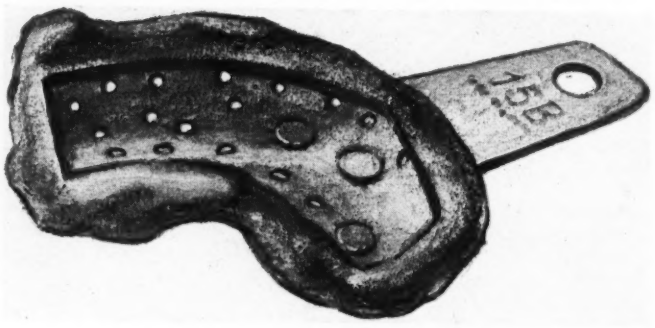


Fig. 2

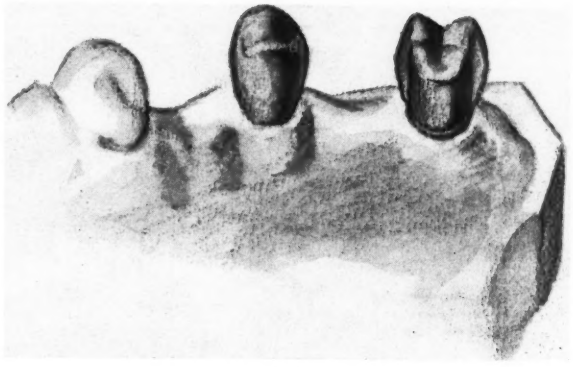


Fig. 3

The elastic impression material is prepared, applied to the tray, placed in the mouth, chilled for about three minutes with cold water, and removed. The model is washed with cold water and poured at once in Cristobalite model investment material mixed to produce greatest expansion. It is essential to obtain the greatest amount of expansion possible; hence, an investment material of known expanding percentages is recommended.

After free water is evaporated following separation, inlay wax is burned into abutments with a blow pipe (Fig. 3) in order to (1) stop the drying of the model; (2) preserve the fine outlines of preparations upon abutments; (3) prevent the wax from pulling away from the model

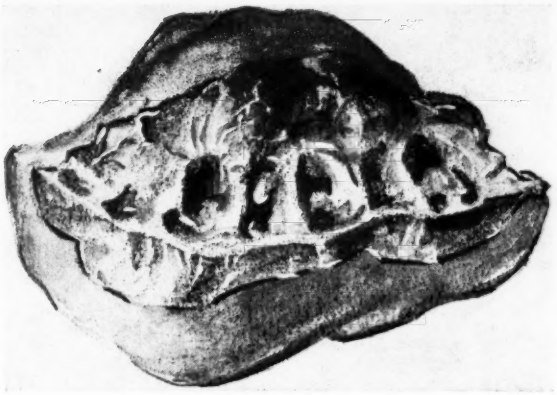


Fig. 4

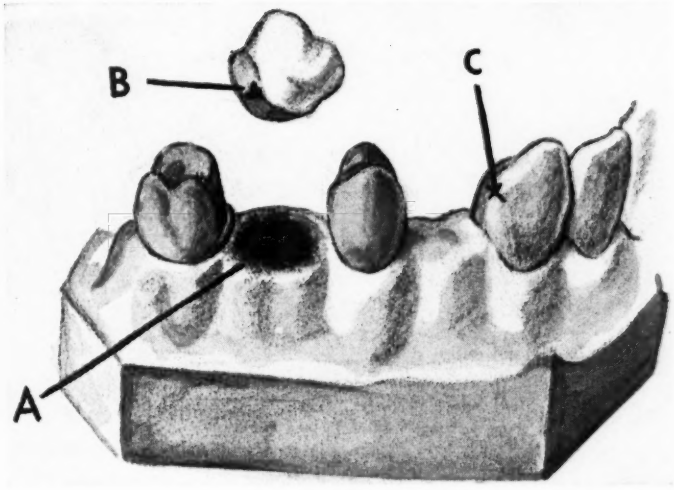


Fig. 5

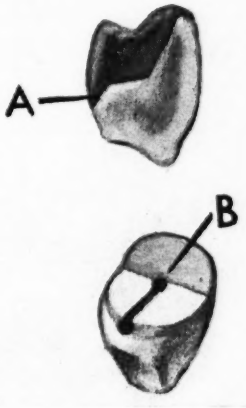


Fig. 6

during the entire period of constructing the bridge, and (4) obtain maximum approximation of gold to the model in casting.

The model is now mounted on the articulator.

Wax Bite Impression

A wax bite impression is taken, chilled, and trimmed on the model side to the occlusal surface. Tin foil is burnished on the occlusal surface. The model is tried in the mouth, and the patient is told to bite again (Fig. 4).

The purpose of the tin foil is to preserve the fine margins on the model and to prevent plaster from going through in cases in which the occlusion shears wax during articulation. Do not wax bite to model around abutment teeth.

Waxing and Grinding

Contact points are established, and approximating teeth are relieved for desired contact (Fig. 5, C).

The abutment is waxed and carved. On margins, in carving a hot carver should be used to prevent any cutting of the model.

With a soft lead pencil, marks are made on the model upon which pontics are to be placed. An imprint will be obtained on the pontic, facilitating grinding and the obtaining of perfect adaptation (Fig. 5, A, B).

To prevent breakage of the slot in the pontic, it is advisable to bevel the extreme lingual margin of the slot (Fig. 6, A).

Backing

Owing to expansion of castings and the termination of the slot into a circle, a cast backing has proved to be impracticable. A technique for making a backing follows:

1. Round, 19 gauge, high-fusing clasp wire is used. Around this is wrapped .001 gauge platinum foil of sufficient width to cover the surface above the slot (Fig. 7, A).
2. The wrapped wire is inserted into the slot, and the platinum burnished (Fig. 7, B).
3. Remove and solder (Fig. 7, C). This step is accomplished in three soldering operations: (a) Tack wire to foil; (b) fill slot; (c) cover backing by sweating a layer of solder. A spur or loop of gold is soldered upon this backing (Fig. 7, D). This is done to retain backing in wax and casting.
4. The pontic is lubricated with cocoa butter, and the backing is applied. The pontic is contoured in inlay wax to a thickness of 2 mm.

A trial removal of backing at this time is advised (Fig. 7, E).

Assembling

The entire case is assembled and waxed. To obtain occlusion and prevent fracturing in assemblage the surface of the bite model is covered and burnished over with tin foil (Fig. 8, A). The articulator is closed. Wax is flowed in the space between the occlusal surface of the bridge and tin foil (Fig. 8, B). Allow to cool; open articulator, remove tin foil, and carve (Fig. 8, C).

Spruing

One sprue for every two teeth is recommended.

To prevent porousness and to ob-

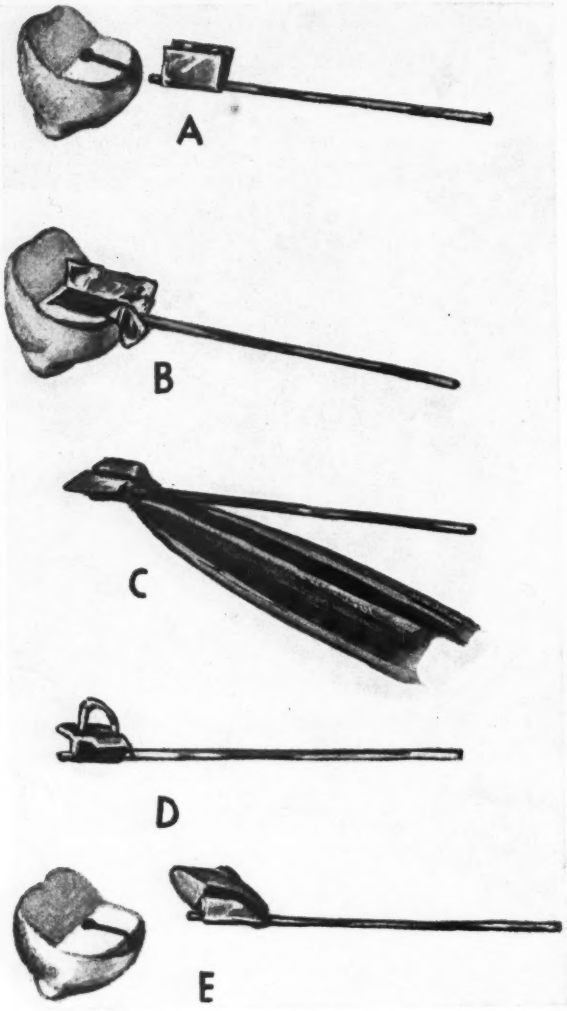


Fig. 7

tain density of margins, a complete circle sprue or vent is used as follows: On the buccal or labial surface a wax sprue is attached about 17 gauge round to all abutments at the distal and mesial, labial or buccal margins, and connected together about 3 or 4 mm. below the gingival margins (Fig. 9).

INVESTING

The case is inserted into the sprue former and waxed with sticky wax to prevent movement. Next the sprue former is waxed to the cement slab.

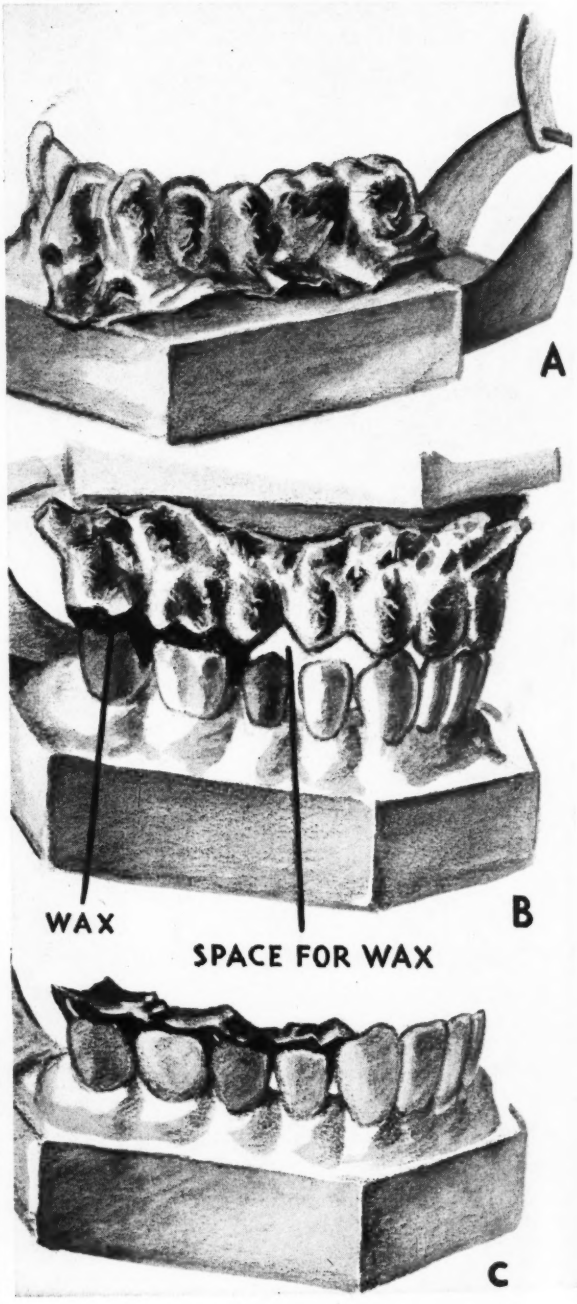


Fig. 8

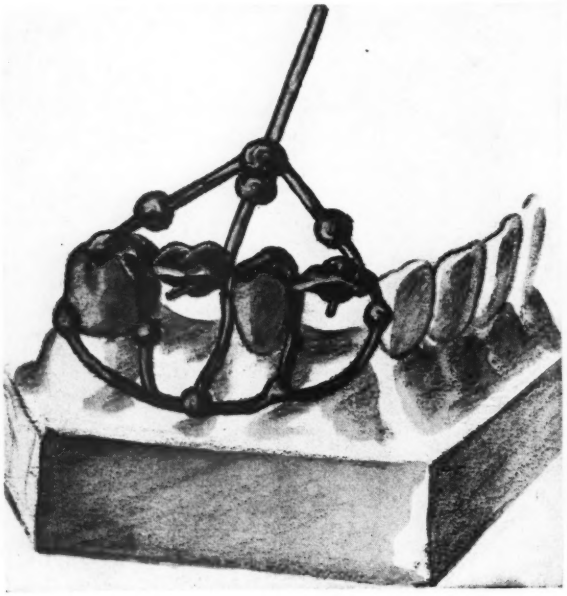


Fig. 9

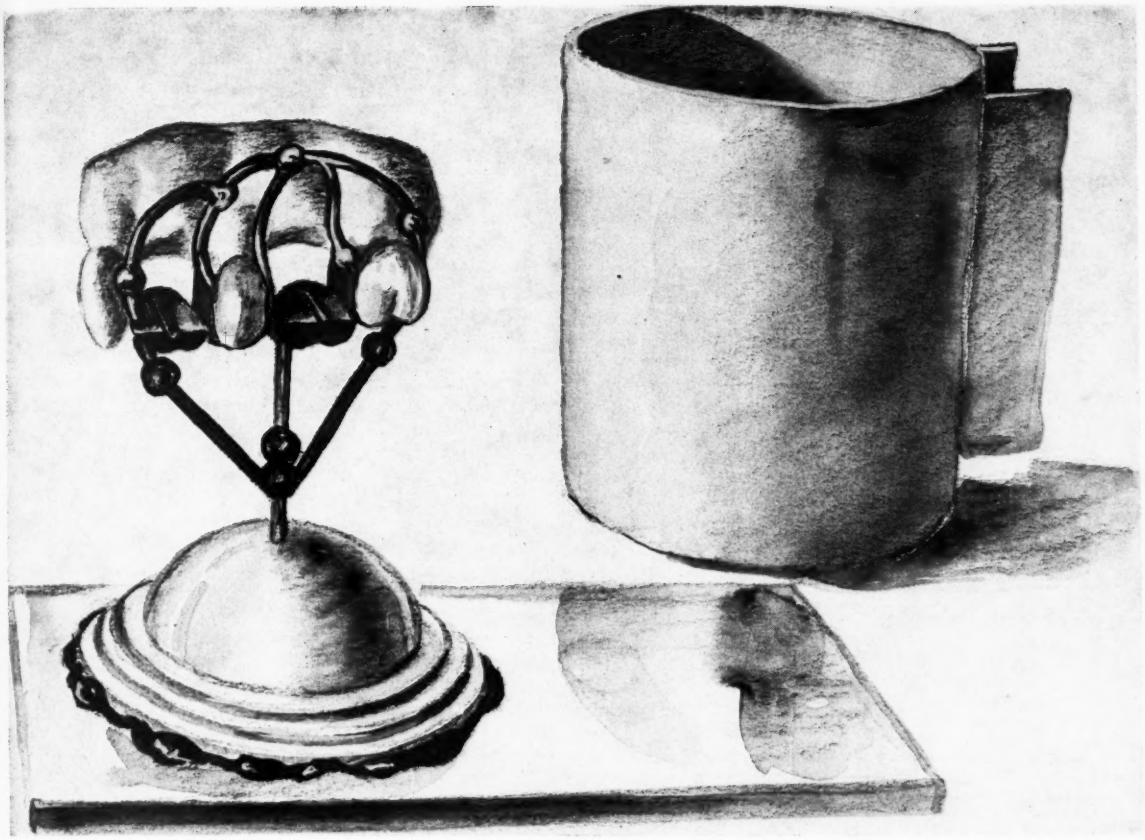


Fig. 10

Soak in water of room temperature. The investment is mixed, the same material and proportions being used as in the model. The entire case is painted. The flask is waxed with sticky wax to the cement slab, filled and vibrated with the same mix.

1608 Milwaukee Avenue.

Sufficient setting time permits these steps to be completed with one mix of investment material (Fig. 10).

Casting

To obtain a smooth casting the oven should be heated first to a temperature of 700°F. upward before inserting the flask. Casting should be done in a hard gold suitable for cast restorations.

The pontics are finished, polished, and glazed.

LETTERS TO THE EDITOR

Adolescent Gingivitis

A youth, aged 16, well developed and healthy except for the condition of his gums, presented himself about a year ago with what seemed to be a simple case of gingivitis. The patient has not responded to usual treatments. There are no deposits on his teeth, no crowns or overhanging margins, nor is there traumatic occlusion. The gums bleed freely when touched with a probe. I have consulted the patient's family physician who prescribed for him without success. The patient's mother tells me he does not eat very much meat, sweets, vegetables, and little white bread, but does eat a great deal of rice.

—B. F. W., D.D.S., *Louisiana*

The case you so ably described is apparently one of the typical forms of the gingivitides found in adolescent patients. One cannot expect immediate response to treatment in this case.

It is my opinion that the only bacteria to be taken into consideration from the standpoint of treatment are the fuso-spirochetal complex.

As a preliminary step the specifics may be used, topically applied. The specific of choice is a 10 per cent glycerinated solution of sodium or potassium bismuth tartrate or in the absence of these preparations the arsenicals will prove efficacious but must be used with considerable care owing to their toxicity. Three or four days of this treatment should suffice. The mouth should then be subjected to a thorough surgical treatment in an effort to eliminate all anaerobic nidi; it is advisable during this procedure constantly to dip the instruments in a spirocheticide.

It has been our experience that if a satisfactory result is to be obtained it is imperative that the patient be instructed in the correct mechanics of toothbrushing. To accomplish this, it may be necessary that you personally supervise the patient's toothbrushing technique from one to a dozen times until he becomes actually proficient.

In the early phases of the treatment we have found that the use of a glycerinated solution of sodium or potassium bismuth tartrate used as a liquid dentifrice is far superior to any toothpaste or powder.

Your patient should be encouraged to ingest in large amounts foods more highly resistant to mastication, particularly raw, hard fruits and vegetables.—P. H. Belding, D.D.S. and L. J. Belding, M.D., *Waucoma, Iowa.*

"I am a subscriber to The Dental Digest and am taking this opportunity to tell you that I think your magazine is the best and most profusely illustrated dental journal I have ever read. I certainly enjoy every number and don't miss a single copy."—A. Werkmeister, D.D.S., *Chile, S. A.*

"Want to compliment you on your magazine. The articles on Relation of Diet to Dental Caries by Doctor Price, alone are worth more than the price of your subscription. I consider The Digest a darn good post graduate course and the best of its kind."—N. C. Hall, D.D.S., *Haines, Oregon.*

ORGANIZATION AND OPERATION OF THE INDUSTRIAL DIAGNOSTIC SERVICE OF THE CHICAGO DENTAL SOCIETY

STANLEY D. TYLMAN, A.B., D.D.S., M.S., Chairman*
Chicago

(Conclusion)

Memorandum to Employees

A general announcement to all employees regarding the program should precede the actual launching of it. It has the effect of "breaking the ice" and places the employees in a receptive mood. Each employee may be given a copy or it may be placed on the employees' bulletin board. The former procedure is recommended as more effective. The following is suggested copy for such a memorandum:

Date.....

MEMORANDUM TO ALL EMPLOYEES:

Your Company, in conjunction with the . . . Dental Society, is providing a complete dental examination, including x-ray for each of its employees. None of the expense will be borne by you.

At ....., ... please report to
hour date
..... to hear a short
room or hall
dental health talk by Dr. ....., representing the Society. Immediately following Dr. .....'s talk the taking of the dental x-ray pictures will begin. As soon thereafter as practicable each employee will be given an examination by a dentist.

Your Company feels that this is necessary health service and expects your cooperation.

Company .....
By .....
Title .....

Fees

The Industrial Diagnostic Service Committee of the Chicago Dental Society has taken the position that the matter of fees for dental service subsequently rendered examined employees by their own dentists is not within its province. In other words, any discussion of fees between the examiner and any employee is expressly forbidden. This is held to be solely the prerogative of the employee's personal dentist.

Membership Incentive

As has been previously stated, the cooperation of the Society should be extended to all ethical dentists, whether they are members of the society or not. In the course of examinations at any plant many employees will give as the names of their dentists men who are entirely ethical but are not society members. Why such men are not members it is not necessary to relate here. It is reasonable to suppose that all such men should be, after having had one or more of their patients sent to them as a result of this service, excellent prospects for society membership.

The following procedure is recommended in the compilation of a list of such prospects: It will be recalled that the original copy of the examination chart is the property of the Committee for use as it sees fit. At the end of any specified period all such original charts are turned over to the Secretary of the society to have the names of the dentists checked against the membership roster of the society. By this process a list of nonmembers can be prepared and should be turned over to the membership committee of the society for action.

It will be readily agreed that the operation of this service should result in a substantial increase in society membership. The argument in favor of membership as a result of securing one or more patients under this service is both convincing and compelling.

Problem of the Unethical Dentist

Approximately 2 per cent of the employees examined will, when asked for the name of the dentist to whom to send the roentgenogram and record, give the name of an unethical dentist or dental parlor. The question immediately arises, what to do? Obviously, the society cannot enter into a cooperative effort with an unethical practitioner. The following plan is suggested:

Go to the original person in the plant through whom the service was inaugurated and lay the problem before him before the service is begun and ask him for authority to refer all such employees to him. Then when the examiner comes upon such a person he performs the usual examination but at the end, instead of asking for authority to send the roentgenogram and record to the dentist, he tells the patient that he is turning over the file to Mr. ....., the personnel manager or whoever this original person in the plant may be, and suggests to the employee that he see him concerning the disposition of the roentgenogram and record. This man will understand the position of the society in the matter and can be expected to handle it to the satisfaction of all parties.

Under no circumstances should the examiner or any other agent of the society advise any employee not to patronize any particular dentist or group of dentists.

"I Have No Dentist"

Occasionally the examiner upon asking the identity of an employee's dentist, will be told: "I have no dentist." The temptation when the employee answers thus is to attempt to direct him toward a member of the local dental society; in other words, to recommend a dentist to him. This temptation must be resisted at all costs. *Under no circumstances is the examiner or the assistant to recommend a dentist or to accept such an employee for his own practice.* Neither the examiner nor the assistant can be sure of the real reason why the employee answered as he did. There are several possibilities: he may never have availed himself of dental service; he may regard the examination and reference as an opportunity to change dentists if dissatisfied, or he may be attempting to circumvent compliance with the program. In either of the latter two instances the possibilities for difficulty in the event of a recommendation are apparent.

The following procedure has proved to be eminently satisfactory and is recommended for the handling of this situation. The examiner should direct the assistant to place the roentgenogram and record ready for mailing in a "pending file" in possession of one of the company officials. The employee is then advised to inquire among his family and friends for the name of a dentist known to be satisfactory. Upon securing a recommendation from this source, he is to give the name to the company official who will then com-

*The Committee of the Industrial Diagnostic Service of the Chicago Dental Society wishes to express its appreciation to all those who by their time and thought have made this program possible. Particularly do we wish to thank Mr. John J. Hollister, Executive Secretary of the Chicago Dental Society, for his many sound suggestions and unceasing efforts in effecting a successful culmination of a worthy project.

plete the record, see that the envelope is addressed and mailed.

By following this procedure the society and its agents definitely prevent any of the untold number of complications that might arise should the society have any part directly or indirectly in selecting a dentist for any employee.

Follow-Up Program

Equally as important as the original examination is the follow-up. Several programs are available and some are listed herewith. It may even be possible to use to advantage more than one follow-up plan, by reason of a different avenue of approach. Local conditions and the willingness or ability of the plant officials to cooperate will be the important factors.

1. Clinical reexamination of all employees at the end of six months. This is obviously the most efficient method of checking results. Using the duplicate of the original examination chart the examiner is enabled to determine *exactly* what services were rendered any given employee and estimate their cash value. The reexamination of all employees in a particular plant will enable the local committee to determine with a fair degree of accuracy the actual amount of money spent for dental service as a result of this program. It also provides the opportunity to find out if members or their families have sought dental service since the program was instituted. The drawback, particularly in communities where the examiners are being paid for their services, is the time and expense involved. There is also the question of whether the interests of the local profession would be better served if such examiners, instead of reexamining employees, were to be engaged in examining employees of another plant.

2. This plan involves the active and complete cooperation of the employer. The plant is divided into sections or divisions with one of the employees, usually a foreman or supervisor, being given the dental record of all the employees under his charge. Every ten days following the examination he checks with each employee to determine the progress he is making and makes a notation on the reverse side of the record. This check is repeated at the end of each ten day period until all employees are in good dental condition.

3. Elsewhere in this article a letter is suggested to be sent to the employee's own dentist. Note that a postscript has been added requesting the dentist to "receipt" for the employee when he has kept his first appointment. This is a U. S. Government post card, self-addressed to the Committee and on the reverse side this copy is carried:

.....193.....

Gentlemen:

Patient No. ..... kept his first appointment with me on ..... 193.....

....., D.D.S.

Address .....

Of course, this does not give detailed information as to the volume of dental work done, but it does act as a certificate to the effect that the employee has actually reported to his own dentist. This is a valuable procedure in order to provide a check list of dentists to whom the Committee can go for actual reports on the work done for certain patients and the amount of money involved. This type of follow-up would be 100 per cent efficient if all the dentists who received patients sent the cards to the Committee. Experience has proved, however, that the full cooperation of the profession, insofar as the mailing of the cards is concerned, cannot be expected.

4. This plan involves the direct cooperation of the examined employees themselves. A form, as suggested elsewhere in this article, is circulated among the employees, with the request from the employer that it be filled out accurately and returned to some designated person in the plant. Since the signature of the employee is not required, a truthful report can be expected. This is a relatively efficient and inexpensive method of determining the results of the operation of this service in any plant.

Legality of the Plan

Able counsel has passed upon the legality of the Industrial Diagnostic Service insofar as the Dental Practice Act of the State of Illinois is concerned. It is believed that it does not contravene the dental laws of any of the states. Just to be certain, however, societies in other states contemplating the adoption of this program are urged to have its legality examined by competent counsel before inaugurating this plan of service.

Equipment and Supplies Required

Capital Investment

The following is a list of the equipment and supplies required to place this service in effect:

Equipment—(1) X-ray machine (borrow or rent); (2) twenty-five explorers; (3) twenty-five mirrors; (4) one large mirror for demonstrating purposes; (5) two portable dental chairs (borrow or rent); (6) rubber gloves; (7) one pulp tester; (8) one shadow box; (9) one electric sterilizer or two white enamel sterilizing trays with covers; one gallon sterilizing solution; (10) one lead screen.

Supplies—(1) Pencils; (2) carbon paper; (3) examination charts; (4) society stationery; (5) government post cards; (6) mounts; (7) envelopes (mailing); (8) x-ray films; (9) small envelopes for x-ray negatives; (10) stamps; (11) fountain pen; (12) printed educational material; (13) paper clips (14) local directory of dentists; (15) local telephone directory; (16) local dental society roster of members; (17) manila envelopes to contain complete record of each employee.

Capital Investment—The necessary equipment can be purchased for a sum not in excess of $150.00 This, of course, does not include either the dental chairs or the x-ray machine. Both of these items can be either rented or borrowed. In order to prevent the burning out of the x-ray tube a fan attachment must be installed. This is a vital point which cannot be overlooked.

The cost of supplies will, of course, depend on the quantity purchases; i.e., the number of persons to be examined within a given period. Roughly speaking, the cost of supplies will approximate 45 per cent of the total cost of the service. This presumes that the examiners will be compensated for their time.

Cost of the Service

Assuming an active interest in establishing this service in a community, the important consideration is the cost involved. In presenting the following figures it is not intended that they will necessarily be either maximum or minimum. Cost variations in different localities may affect these figures up or down. Rather it is intended merely to give the reader a general idea of the cost per patient examined of the various items and services that are fundamental to its operation:

1. Postage	$ .05
2. Assistant's salary	.05
3. Technician's salary	.05
4. Examiners' salaries	.17
5. Developing and mounting	.10
6. Examination charts	.02
7. X-ray films	.24
8. Mounts	.03
9. Envelopes	.01
10. Stationery	.01
11. Expressing and Miscellaneous	.02
	$ .75

As will be noted there are eleven items entering into the general cost. For purposes of clarity each will be discussed in detail.

Postage—Under the postal laws in effect as of May 1, 1934, the cost of mailing within the corporate limits of any city was $.04 per unit. Units mailed from one city to another required $.06 in postage. Future modifications of the postal revenue laws

would necessarily affect the figures given.

Assistants' Salaries—The cost figure of $.05 per employee examined is predicted upon a monthly salary to the assistant and technician of $75.00 each. In order to keep this item down to $.05 it is necessary to examine not less than sixty persons per working day. Coincidentally, the same time is required to make the roentgenogram as is required to complete the clinical examination; hence the identical cost per employee.

Examiners' Salaries—It is conceded to be desirable to compensate the examiners, in part at least, for their work. In many communities it may not be possible to do this, which means free service on the part of the dentists. When it is possible to offer something to examiners a fee of not less than $10.00 per day is suggested. Even on this basis it is apparent that the examiner is making a definite personal contribution to the welfare of the community and the profession.

A productivity figure of sixty employees per day gives the individual cost of $.17.

Developing and Mounting of X-Ray Films—For purposes of simplicity, efficiency, and economy, every effort should be made to effect a satisfactory arrangement with a private x-ray laboratory for providing this service. The society should not establish its own laboratory facilities if at all possible. Not only does the establishment of a private laboratory involve considerable capital investment but the space requirement also presents a difficult problem.

Examination Charts—Examination charts are printed in triplicate for the purposes outlined under Method of Procedure. Because of the strong demand for them from dental societies in all parts of the United States, the printer employed by the Chicago Dental Society has printed a large quantity of charts for general use, thus enabling local societies[1] anywhere to buy them from this Society at a substantial saving. The following price list is in effect:

500 triplicate sets	$15.00
1000 triplicate sets	25.00
2000 triplicate sets	40.00
3000 triplicate sets	52.50
Additional thousands over 3000	11.50

As can readily be seen the cost per chart of $.02 is based on a purchase of 2000 triplicate sets. On large orders the per unit cost progressively decreases.

X-Ray Films—The figure of $.24 per set of films is based first on a gross cost of $2.40, and second, a standard of fourteen films to the set. Naturally, the per set cost will vary with any variation in either the number to the set or the per gross cost. If a single rather than a double film is used there will be a further saving. A standard of 6-second exposure time of the film is recommended in the absence of definite contraindications.

X-Ray Mounts and Mailing Envelopes—The Chicago Industrial Diagnostic Service Committee recommends no particular type of mount. The one in use here may be purchased for $.03 each and has proved satisfactory. Obviously, the envelope and mount should be purchased at the same time.

Stationery—With each set of roentgenograms must go a letter of explanation to the dentist. It is suggested that the regular letterhead of the society be used. In substantial quantities the unit cost figure should be well below $.01.

Expressing and Miscellaneous—This is, of course, a decidedly variable figure but the $.02 item should cover all expenditures not accounted for elsewhere.

Employees Required

Two paid employees are required to carry out technical procedures, an x-ray technician and trained dental assistant. Salaries will, of course, depend on local conditions.

X-Ray Technician—It is essential that the x-ray technician be unusually competent for two reasons: first, because the system practically precludes "retakes," and second, because a high standard productivity is required; i. e., a minimum of fifty complete roentgenograms per day. This is based on sets of fourteen films each. In the event of a lesser number of films per set the daily quota can be increased proportionately. This technician should be properly protected by a lead glass screen to prevent untoward biologic reactions.

Dental Assistant—Speed and accuracy, combined with a pleasing personality, are the basic requirements for the holder of this position. As the general assistant to the examiner, it becomes her duty to chart the dental defects, do all the clerical work incident to the mailing of material to the dentists, see that an adequate supply of sterile mirrors and explorers is on hand at all times, and, in general, facilitate the work of the examiner as much as possible.

It is suggested that both employees be required to be in uniform on duty.

Practical Suggestions

1. The supply of films should be stored where it cannot be affected by the operation of the x-ray equipment. A steel cabinet will serve the purpose well. If this is not available the films should be stored at a safe distance from the machine.

2. In starting the roentgenographic and clinical examinations it is excellent psychology that the committee insist on having the highest official of the company as the first person to be examined. The employees will like the program a great deal better if they see the officials participating.

3. If it can be prevented, the speaker giving the health talk should not do so during the employees' lunch period.

4. It is essential that there be no time wasted in carrying out both the roentgenographic and clinical examinations. For this reason it is suggested in starting each examination that two employees be brought to the examination room, one to be placed in the dental chair and the other in the waiting chair. Then, when the first person has had his examination completed he returns to his department in the plant and sends another employee to the examination room who, in turn, occupies the waiting chair just vacated by the person undergoing examination. By following this procedure both chairs (dental and x-ray) function without loss of time.

5. With everything else in operation, the success of the program depends on the cooperation of the profession. If any considerable number of dentists attempt to take undue advantage of the fact that an employee is expected, as a condition of employment, to put his mouth in condition and provide him with a type of service beyond his ability to pay for, the entire program must be abandoned. It just cannot work without the wholehearted and broadvisioned cooperation of the profession.

6. In arranging the service with the company, one should be sure to ascertain the hours of work and the number of shifts. This is vital in order that the hours of the examiners, x-ray technician, and assistant may be adjusted accordingly.

7. The examiner, before discussing any employee's mouth condition with him, should first have as much information from the employee as possible regarding his dental habits. Particularly should this be done when the condition of the employee's mouth definitely shows regular dental care. Occasionally in such cases the roentgenogram will reveal defects unknown to the employee and apparently unknown to the employee's dentist. Usually the employee will reveal, upon questioning, that he has had no dental roentgenogram made in recent years. Such a situation is a delicate one and calls for the full use of the

[1] Interested societies will please address all inquiries and orders direct to the Chicago Dental Society, Industrial Diagnostic Service Committee, 185 North Wabash Avenue, Chicago.

examiner's powers of tact in order not to disturb the relationship existing between the employee and his dentist.

8. In order that the economic benefit to the local dental profession may be distributed as evenly as possible, it is suggested that industrial contacts be made that are representative of all geographic areas in the community. Particularly should this procedure be followed in the larger cities.

Statistical Investigations and Reports

Local societies who adopt this program are urged to consider the unique opportunity this service offers to obtain statistical data regarding the dental requirements and habits of the population as the employed group of any community can certainly be considered representative. In the event such a program is to be undertaken in conjunction with the Industrial Diagnostic Service, the x-ray film packets purchased must contain duplicate films. Upon development the duplicate films are filed with the Committee's copy of the examination chart and are thus available for statistical study to any group at any time.

In addition to the purely statistical aspect of the project, it is also essential to know the number and character of dental defects uncovered, the time given by examiners and their identity, the number of employees examined in any given day or half day, and other information held to be desirable by the Committee. For this reason a report sheet has been prepared and a facsimile reproduced on this page. This is to be filled out daily by the dental assistant and at intervals to be determined by the Committee, submitted to the Chairman.

185 North Wabash Avenue.

CHICAGO DENTAL SOCIETY
INDUSTRIAL DIAGNOSTIC SERVICE
EMPLOYEE QUESTIONNAIRE

1. Did you go to your dentist following the examination at the plant_____
2. If not, please state reason_____
3. Approximately how many appointments did you have with your dentist?_____
4. All dental work completed?_____ Partially completed?_____
5. Check work done

No.		Approx. Cost	No.		Approx. Cost
____	silver fillings	$____	____	cleaning	$____
____	gold inlays	____	____	cement fillings	____
____	crowns	____	____	porcelain fillings	____
____	bridges	____	____	teeth extracted	____
____	plates	____	____	minor mouth surgery	____
____	root canal fillings	____	____	treatments	____
____	partial plates	____			

6. Total amount spent for dental work. $_____
7. Following the examination did any of the members of your family seek dental service and, if so, how much money was spent for it? $_____
8. Comments _____

(Signature of employee not required)

ABOUT OUR CONTRIBUTORS

John J. Fitz-Gibbon is the subject of editorial comment on The Editor's Page of this issue of The Dental Digest.

Fred Carmosin received his D.D.S. from the Temple University School of Dentistry in 1930. Doctor Carmosin has contributed to the dental literature on other occasions. He is a member of the Eastern Dental Society and Alpha Omega. For four years he was engaged in research in pathology at Northern Liberties Hospital and is at present studying nutrition in relation to dental caries, and has a general practice in which he stresses particularly oral pathology.

M. Hillel Feldman, D.D.S., has been a frequent contributor to this magazine and his professional biography appeared in an early issue of the new Dental Digest.

Charles P. Janicki was graduated from Northwestern University School of Dentistry in 1913, and has since been engaged in general practice. Doctor Janicki is a member of the A. D. A., Illinois State and Chicago Dental societies.

The biography of Stanley D. Tylman, A.B., D.D.S., M.S., appeared in the July issue of The Dental Digest.

Joseph Anthony Hopkins received his D.D.S. from Northwestern University School of Dentistry in 1918. Doctor Hopkins has made several contributions to the dental literature. He is on the staff of St. Anthony's Hospital and is oral surgeon at Northtown Hospital, Rockford, Illinois. His practice is devoted mainly to exodontia and oral surgery with particular attention to pathologic conditions in the oral cavity. Doctor Hopkins is a member of the A. D. A. and component societies.

Maurice A. Goldberg received his D.D.S. in 1925 from Georgetown University School of Dentistry. Since 1926 Doctor Goldberg has been assistant professor of prosthetic dentistry and professor of dental materials at the Georgetown University School of Dentistry.

Don E. Woodard received his D.D.S. in 1923 from the State University of Iowa, College of Dentistry and his M.S.D. in 1930 from Northwestern University Dental School. Doctor Woodard has been a contributor to both the dental and medical periodical literature. He is a member of the American Dental Association and component societies, and attending chief oral surgeon, Kansas City General Hospital and visiting oral surgeon at the Research Menorah, and St. Joseph Hospitals, Kansas City, Missouri. Doctor Woodard specializes in oral surgery.

ELECTROSURGERY IN THE ORAL CAVITY

JOSEPH A. HOPKINS, D.D.S.

Rockford, Illinois

HISTORICALLY, the foundation of electrosurgery was probably laid when William Gilbert (1540-1603), physician to Queen Elizabeth, experimented with magnetism and electricity. The construction of the Leyden jar of Musschenbrock (1746) and the discovery of induction by Oersted (1821) was a further development. Nollet, in 1834, demonstrated the static breeze and sparks, and he was followed by Morton who, in 1881, reported his work with the static induced current. In 1891, d'Arsonval demonstrated that high frequency currents could traverse the human body without neuromuscular response, but with elevation of temperature. This was the beginning of diathermy. Tesla, in 1891, developed a current of lower amperage and higher voltage. Oudin followed in 1893 devising a resonator that produced extremely high voltage with correspondingly low amperage. Negelschmidt, in 1897 demonstrated the efficacy of high frequency currents in diseases of the joints and circulatory system, and applied the term "diathermy." Riviere apparently made the first surgical use of high frequency currents in applying the spark on an indolent ulcer. In 1909 Pozzi announced the treatment of cancer by the sparks from the Oudin resonator, which he called, "fulguration."

Apparently the first idea of what is now known as electrocoagulation was developed by Doyen in 1907. By this method he raised the temperatures at the surface of the carbonized tissue up to 900-100° F. Further, noting that the effect of the current upon tissue was not a function of the length of the spark, he[1] pointed out that the short branching sparks from the primary current of Oudin's resonator were more effective than the long ones from the secondary. Doyen continues, I also noticed that, in order to obtain powerful effects, it was necessary to connect the metallic bed on which the patient lay with one of the extremities of the self-induction oscillating current, while the active electrode was in contact with the other. Sometimes I held the electrode a short distance from the patient, whose tissues were burnt by a short and brilliant spark. I then called this effect bipolar voltization, and sometimes I placed it in contact with the surface of the wound so that the spark was suppressed (electrocoagulation).

By his electrocoagulation, Doyen obtained a penetration depth of 6 or 8 cm., according to the size of the electrode. The temperatures reached by the application of this current were as high as 500°C. (932°F.) to 600°C. (1112°F.) at the surface of the carbonized tissue. Further, carbonization did not take place when the electrode was brought into contact with the tissue, coagulation being the only result.

Riviere[2] demonstrated these destructive effects of currents of high frequency and low tension before the French Surgical Congress, October 10, 1907.

Ward and Fred West, Jr. confirmed Doyen's measurement of temperature about 1925-1926. They used a needle electrode in beef muscle.

In 1908 de Forest made the first radio tube apparatus capable of furnishing cutting current with which Neil and Sternberger made fine, clean incisions with little bleeding on dogs. Eitner and Czerny described the cutting to tissue with high frequency currents in 1910.

William L. Clark of Philadelphia from 1910 on began and continued investigations in this field which has earned him the title "Progenitor of American Electrosurgery."

The following quotation is taken from Kelly and Ward[3]:

In recalling the early history of electrosurgery in this country and crediting Titus . . . Clark adds, "At that time I knew nothing of the work of Doyen, Nagelschmidt, Czerny, Riviere, de Keating Hart, et. al. . . . I had not read anything upon electrosurgery other than electrolysis." Later on, he met Cook and Harvey King, the latter an early user of high frequency currents for the removal of small benign growths. Clark, however, was the first in this country to venture to remove large growths, benign and malignant: extensive epitheliomata, angiomata, pigmented nevi of the skin, and extensive malignant lesions of the oral cavity and throat, and to perform amputations of tongues, resection of jaws, evisceration of orbits, removal of noses, ears, etc., and amputation of breasts, and coagulation of cervical cancer (cancer of the cervix uteri). Of this Clark says, "I do not wish to make any particular claim for priority in anything except, perhaps, the recognition of the different effects produced by various qualities of currents, demonstrated by histologic studies. The term *desiccation* and the working out of its possibilities are my own. I had something to do with improving the technic of coagulation and also in improving the quality of high frequency currents for surgical work, by study of the proper capacity, inductance, and resistance necessary to produce the best effect.

Clark's work was so distinctively outstanding and different from that of all predecessors that W. W. Keen and J. Chalmers Da Costa requested chapters for their surgical treatises, inaugurating the first substantial recognition in a great authoritative work. His preeminent achievements bear throughout the hallmarks of perspicacious, persistent, accurate, scientific endeavor. With his coworkers he carefully studied the immediate and remote effects of surgical high frequency currents upon tissues, as they watched wounds heal and described types of scars.

The electric cutting knife and electrocoagulation will be discussed in this article as it applies to oral surgery. This is a new instrument for the dental surgeon, although it has been used for a good many years by the general surgeon with good results.

The electric knife is readily controllable and entirely safe if used by a properly trained and experienced surgeon. I believe that I am the first in my profession to use the radio knife in surgical elimination of pyorrhea pockets, as I demonstrated this at the Chicago Centennial Dental Congress, August 12, 1933.

Any oral surgeon may adapt himself to the use of the electric knife by experimental work on animals. We first used veal heads which are easily obtainable. The veal head is placed on the large electrode and after some experimental cutting, the surgeon will soon be able to tell the amount of current required for cutting different tissues. A complete gingivectomy may be done around the teeth of the lower jaw. Imaginary tumors may be removed from the cheek and palatal area. In this way one becomes accustomed to the feel of the cutting knife.

The advantages of electrosurgery

1Doyen, E. L.: Surgical Therapeutics and Operative Technique, 1, 1917.

2Riviere, A. J.: On Destructive Effects of Currents of High Frequency and Low Tension. Rev. Crit. Med. et Chir. 11 and 12, 1907.

3Kelly, H. A. and Ward, G. E.: Electrosurgery, J. A. M. A. 98, February 20, 1932.

over the use of the scalpel may be attributed to the fact that a clean-cut incision may be had with practically no hemorrhage. The small severed vessels do not have to be ligated as they are completely sealed by coagulation. This is done directly at the time of the incision. If any small vessel of about 1 mm. in diameter or more continues to bleed, it may be touched by the knife, or a hemostatic clamp may be applied to a small isolated bleeder and the clamp touched by the coagulating electrode.

After a microscopic section of tissue has been studied, which has been removed by electrosurgery, one can readily see other advantages: the prevention of metastasis from malignant particles from cancerous and other diseased areas into other parts of the body. This is especially true of the infection that is present in the pyorrhea pockets.

I shall describe the complete gingivectomy. A complete physical examination by a physician should be made to determine the presence of any systemic disorder, such as diabetes mellitus or the blood dyscrasias, such as agranulocytosis or the leukemias. Wassermann, or Kahn tests should be made and a differential red and white count taken. A complete history of the patient is recorded and study casts of the mouth are made. With these preliminary measures complete, an oral examination is made consisting of full mouth roentgenograms; transillumination; pulp tests; pockets checked and recorded as to location, depth, and tissue tone; microscopic smear for the detection of Vincent's infection, and macroscopic examination for pus.

When all the examinations, tests, and charts are completed, and the case is found to be favorable for a gingivectomy, one can proceed with the operation, although I advise operation only in cases in which there is one-half or more of the bone supporting structures remaining.

The tissue of the oral cavity should be made as near sterile as possible, and then with a local anesthetic, all areas that are to be operated on are blocked off. The electric knife is never used in the presence of ethylene or ether anesthesia, because of the danger of a spark igniting these gases.

Technique for Gingivectomy

1. A large indifferent metal electrode is applied to some part of the naked body. Usually the patient sits on this electrode which is placed directly in contact with the skin so as to make a good contact. This electrode is connected to the indifferent plug on the machine (Fig. 1).

2. The proper knife is fitted into a suitable insulated handle (Fig. 2). This active electrode is connected by a cord to the opening marked for cutting current. The foot switch is then

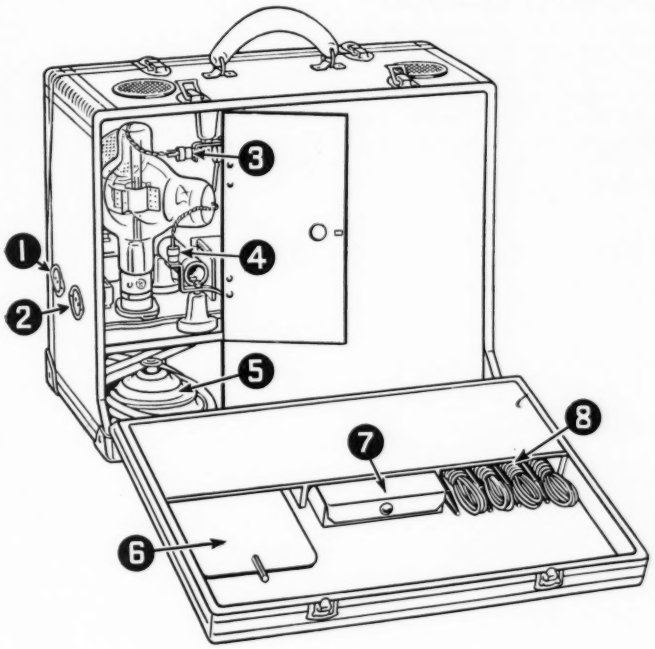


Fig. 1

Fig. 2

Fig. 1—Rear view of electrosurgical unit: (1) foot switch receptacle; (2) entrance cord receptacle; (3) upper tube terminal; (4) center tube terminal; (5) foot switch and cord; (6) pure silver electrode; (7) instrument case containing six special electrodes and two control handles; (8) flexible cords, plugs, and operating handles.

Fig. 2—Electrodes used for oral surgery: cutting and coagulation.

DEFINITIONS

DIATHERMY: The therapeutic use of a high frequency current to generate heat within some part of the body.

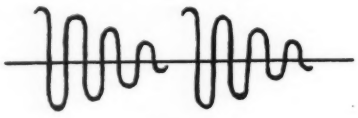
ELECTROCOAGULATION: Coagulation of tissue by means of a high frequency electric current. The heat producing the coagulation is generated within the tissue to be destroyed.

FULGURATION: The destruction of tissue by means of long high frequency electric sparks.

ELECTRODESICCATION: The destructive drying of cells and tissue by means of short high frequency electric sparks.

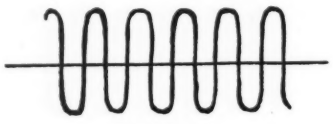
ELECTRIC KNIFE: A surgical instrument with blade, wire, or needle energized by an electric current of such high frequency as to create a molecular disintegration of tissues, sealing lymphatics and capillaries as the cut is made.[4]

SPARK GAP CUTTING CURRENT: A high frequency oscillating current in the nature of a **damped** wave, which means that each succeeding oscillation after the first becomes less until zero is reached. A series of such damped waves makes up a **wave train.**



Damped

VACUUM TUBE CUTTING CURRENT: A high frequency oscillating current with **undamped** oscillations of equal amplitude.



Undamped

From The Handbook of Physical Therapy, Chicago, American Medical Association.

Fig. 3—Control panel of unit: dissection power control dial which controls cutting intensity; dissection switch to provide either a cutting current or coagulating current; receptacles for inactive and active electrodes.

connected to the machine and placed in an accessible spot for the operator.

3. The machine is set at five or ten on the cutting dial. Each machine must be tested for the dial setting to find the best cutting current (Fig. 3).

4. I usually make a bleeding point at the depth of each pocket on the buccal and lingual tissue (Fig. 4). The first knife I use has a flat blade. This is placed on the tissue at the distal surface of the bleeding point. The knife is drawn forward to meet the next bleeding point, until all the lingual pockets are incised.

5. The same procedure is followed on the buccal (Fig. 5).

6. With another cutting instrument shaped like a needle the interproximal spaces are dissected (Fig. 6). The tissue is loose and may be removed with a pair of hemostats.

7. The surface is then washed thoroughly with physiologic solution of sodium chloride to wash away any small detritus.

8. If any bone should be removed, this is done with curets or bone chisels.

9. (a) A surgical cement pack may now be applied to protect the tissues while they are healing and also to keep the teeth from being sensitive. (b) The pack is mixed thick. (c) The pack is then forced between the interproximal spaces from the lingual until it comes out on the buccal surface. This is the best way to do as it is locked securely between the necks of the teeth. (d) Then a strip is formed the length of the lingual and pressed gently to place. (e) This is also done on the buccal. This strip is smoothed on all surfaces with the fingers so that it will completely cover all tissues that were exposed by the incision. (f) Also, the patient is told to extrude his tongue in order that the pack will not interfere with the movements of the tongue during speech or mastication. (g) The pack will set in about fifteen minutes, and the patient may then be dismissed. (h) This pack should be inspected every day for about ten days. If it is loose or broken, a new pack should be placed. (j) After the pack has been in place for ten days, it is removed.

10. The tissue should be gently irrigated with warm physiologic solution of sodium chloride to work off all detritus. The tissue will have a red and inflamed appearance. This is new tissue that has grown under the pack.

11. The patient should be instructed in oral hygiene, and told to use a bland mouthwash. The gums should be massaged several times a day with a piece of soft spongy rubber.

12. It will be noted that the gums

[4] From Kelly and Ward, footnote 3.

Fig. 4—Pockets are measured for depth on buccal and lingual with an explorer. With the explorer a bleeding point is marked along the buccal and lingual surfaces which corresponds to the greatest depth of pockets that are to be eliminated.

Fig. 5—With a flat bladed electrode connected to the dissecting opening a horizontal incision on the buccal and lingual surfaces is made connecting all bleeding points. Thus the pyorrhea pockets are eliminated on the buccal and lingual surfaces.

Fig. 6—With a needle pointed electrode the interproximal tissue is dissected. This is the last step with the radio knife for the removal of the soft tissue forming the pyorrhea pocket. Any rough or diseased osseous structure should be removed at this time with files or curets. Packing is then done with pyorrhea cement to cover necks of teeth and tissues. Packing is left in place for ten days.

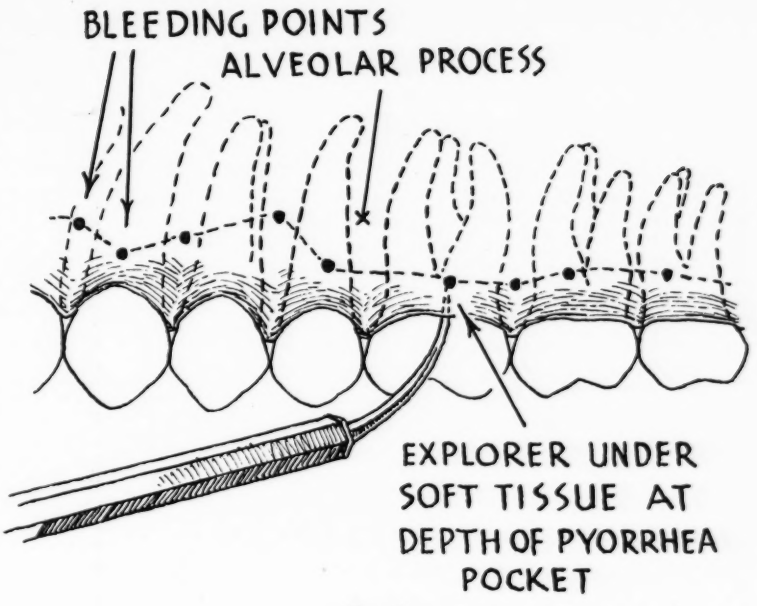


Fig. 4

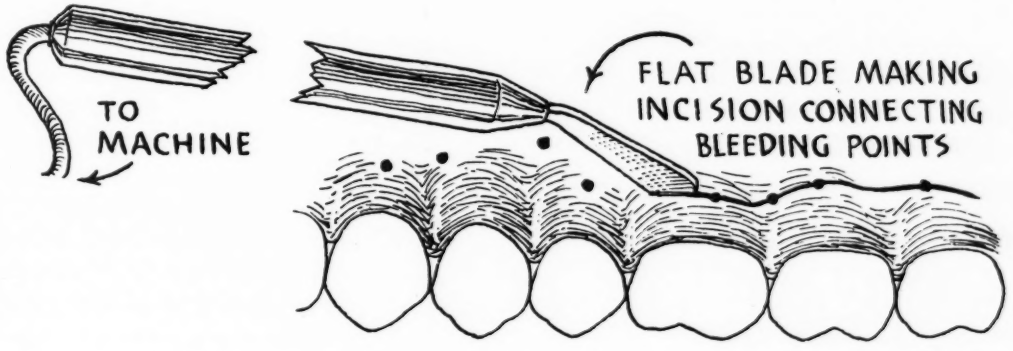


Fig. 5

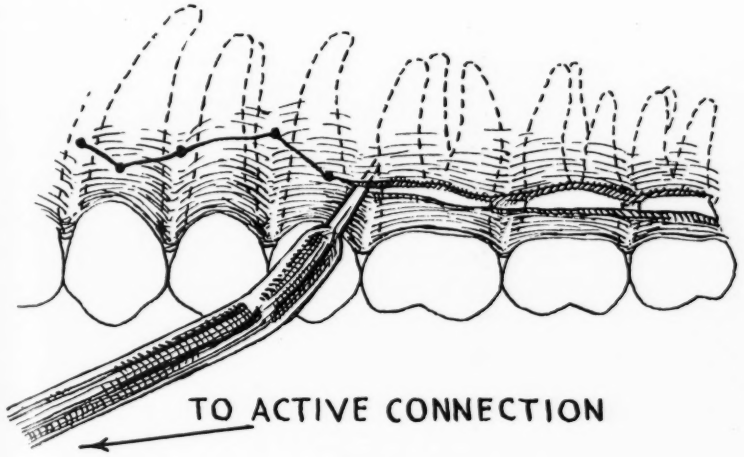


Fig. 6

810 Talcott Building.

will gradually become firmer and take on a healthy pink color. If there are any hypertrophied areas that do not become firm, the operator may insert an explorer into the tissue to find whether there are some calculi or small sequestra of bone present which should be removed.

13. A thorough prophylaxis is now done. As time goes on, the gums will take on festoons and good tissue tone. At this time, the teeth should have all contact adjusted and then be placed in perfect balance. The patient should be instructed in proper toothbrushing, such as Charters' technique.[5]

The technique described here is one of the most gratifying operations for both the patient and the dental surgeon. Experience, skill, and keen judgment count in this work as in any other.

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5 Charters, W. J.: Eliminating Mouth Infections With the Toothbrush and Other Stimulating Instruments, DENTAL DIGEST, 38: 130 (April) 1932

The Editor's Page

CLEFT palate is a major physical defect with serious mental complications. The cleft palate patient has speech difficulties that make it difficult for him to take his position in the social order. As an outgrowth from his physical defect he may develop personality difficulties of inferiority. Those cases which cannot be corrected by surgery may be corrected by prosthetic appliances. Most of the old types of appliances were cumbersome, unhygienic, and did not properly restore the function of speech.

Doctor John J. Fitz-Gibbon has spent his life in perfecting an appliance that is no more cumbersome than a denture, that may be kept clean, and that restores speech. In the present issue of this magazine the technique for construction of this appliance is described in detail.

We have asked a prominent contemporary of Doctor Fitz-Gibbon in the field of prosthetic correction of cleft palate to comment on this technique. Doctor Stanley D. Tylman, of the College of Dentistry, University of Illinois, writes as follows:

"The general practitioner is not often confronted with the problem of prosthesis for the cleft palate, acquired either congenitally or accidentally. The infrequency of its occurrence has retarded the more rapid development of this science. The amount of knowledge on this subject possessed by the general practitioner has been gleaned through one or two lectures during the college course. Such meager instruction is not commensurate with the knowledge and technique required for the construction of a satisfactory and efficient appliance.

"Another retarding factor is the prevalent impression that the degree of technical difficulty encountered is such that superhuman skill is a prerequisite. As a result, the unfortunate persons thus afflicted either receive no help or get an inefficient and mediocre appliance, the benefits of which are questionable.

"Occasionally, patients may be referred to someone who has made a study and practice of this type of prosthesis and receive an appliance such as that described in the article by Doctor Fitz-Gibbon in this issue. It is my opinion that Doctor Fitz-Gibbon is making a valuable contribution to dental science.

"The pioneer efforts in this field consisted primarily in bridging the palatal aperture with a vulcanite denture of some sort; no effort was made to restore the soft palate or its impaired or lost functions. The Kingsley velum consisting of soft velum rubber was an improvement in that an effort, partly successful, was made to restore the functions of the cleft or missing hard and soft palates.

"The velum obturator of hard vulcanite, as developed by the late Doctor Calvin Case and used successfully by many men, was a distinct advance in this science. The final stage in the development of the obturator is found in the Fitz-Gibbon appliances.

"As a result of experiences with the three types of appliances, I am of the opinion that the Fitz-Gibbon type, if constructed carefully and accurately according to the technique presented in his present article, will enable the dental profession to restore to society many useful persons who otherwise might become a burden to themselves and to others.

"The technique presented may be mastered by any dentist of average ability who is willing to spend the time and devote the study necessary to master it.

"The number of unfortunate ones with cleft palates in this country is greater than is generally supposed, and it is our duty to meet and fulfill this professional obligation. It is possible to do so and to do it well. The profession is grateful to Doctor Fitz-Gibbon for this splendid article."

BENEATH IT ALL

FRANK NORRIS named the book for his central character, a dentist, McTEAGUE. "A Story of San Francisco," the author calls it, but the story does not depend on the locality—the setting, as usual, is merely a convenience. It might have happened in any large city in that stage of education in America's history when dentistry was learned by the preceptor method, and chance counted more than supervision, skill, or foresight. If the preceptor was a scholar, a man of ability, a conscientious practitioner, and if the student was observant, diligent, and, in all, capable of being guided and taught—then, the method of instruction was not only satisfactory, but frequently a master produced a better master. This is not strange. Even today there are advocates of similar systems of education. But if the preceptor happened to be more or less of a charlatan, no one cared very much.

McTeague was the son of a miner, destined to be a miner himself, and would have been a good one, if a traveling dentist had not happened to pitch his tent in the mining district to fire Mrs. McTeague's ambition to have her son learn this profession.

> He had learnt it after a fashion by watching the charlatan operate. He had read many of the necessary books, but was too hopelessly stupid to get much benefit from them. Often he dispensed with forceps and extracted a refractory tooth with thumb and finger. There was a washstand behind the screen in the corner where he manufactured his moulds . . . The other ornaments were a small marble-topped table covered with back numbers of *The American System of Dentistry*. The whole place exhaled an odor of bedding, creosote, and ether. . . . McTeague took down his concertina from the bookcase, where in week days it kept the company of seven volumes of *Allen's Practical Dentist*.

The acquisition of a gold tooth had made McTeague a full-fledged dentist. It projected from the corner window, "a huge gilded tooth, a molar with enormous prongs, something gorgeous and attractive."

And so, though mining was McTeague's birthright, he blundered into a profession called dentistry. This soon became a habit which he practiced to the tune of a canary bird in its cage over the operating chair. But one day the habit was disturbed. McTeague found an oblong letter thrust through the letter-drop of the door of his "Parlors."

> Contained in the fat oblong envelope was a printed form with blanks left for names and dates, and addressed to McTeague from an office in the City Hall. "I don' know, I don' know," he muttered. The printed notice informed McTeague that he had never received a diploma from a dental college, and that in consequence he was forbidden to practice his profession any longer. A legal extract bearing on the case was attached in small type. ". . . is herewith enjoined from further continuing—" . . ."Ain't I a dentist? Ain't I a doctor? Look at my sign, and the gold tooth you gave me. Why I've been practicing for years. What was the good of going to college? I learned from him to operate. Wa'n't that enough? Ain't I a good dentist? Rub it out. Rub them all out." [Meaning the appointments.]

Thus McTeague discovered that despite the insistence of *habit,* he was in fact, not a dentist.

Actually, McTEAGUE is a study in greed and niggardliness. It is, also, a study in habit frustration and its attendant consequences. Standards had changed. McTeague's inability to grasp the *fact of change,* to reconcile himself to its logical inevitability, and to adapt himself to a new order of events, far removed from the grooves in which he had spent his daily life for fifteen years, is strikingly comparable, it seems to me, to the perturbed effusions concerning social changes today. Too many of us have believed we have made vocational adjustments whereas in reality we have merely fitted ourselves into grooves, which we are now trying to use as hiding nooks, a refuge from the future. Instead of trying to comprehend the forecasts of the future, we condemn what we are afraid to understand.

The conflicting expressions concerning the changing social trends of the present, I believe, are not all rational objective interpretations, but are rationalized emotions, primarily to be attributed to the dread of having habit fixations disrupted, and secondarily, to the fear of the unfamiliar. Some writers would melodramatically drag prophecy into the present by the tail; others would pull back its horns to prevent its fulfillment. Innovations are at once tantalizing and fear-inspiring. But without them the evolutionary process in social organization would not be possible. Notwithstanding, the *Journal of the American Medical Association* writes as though tradition can arrest any process indefinitely:

> It remains to be seen whether the American medical profession as represented by organized medicine . . . wishes to continue its policy of careful experimentation with new methods of medical practice, observing the ethics and traditions of medicine or whether it is ready to endorse on a nationwide scale some step toward the socialization of medical care.

It seems, too, that beneath the conflicts between professional men and professional men, between "doctors" and social workers, between "doctors" and patients, between those who would hasten a new order and those who would maintain the old, and between all these and the ones who would keep the good of the old and

(*Continued on page* 285)

DENTAL MATERIALS: A DIDACTIC SUBJECT

MAURICE A. GOLDBERG, D.D.S.
Washington, D. C.

A STUDY of the dental journals brings to us the realization that the trend of dental thought is being exerted in the direction of the materials in use today. We recognize without question that the proper actions of our materials depend on the quality of the ingredients, the care in the manufacture, and the proper manipulations.

The United States Bureau of Standards, through its Department of Dental Research, has set up certain requirements for some materials. It has arrived at its conclusions after

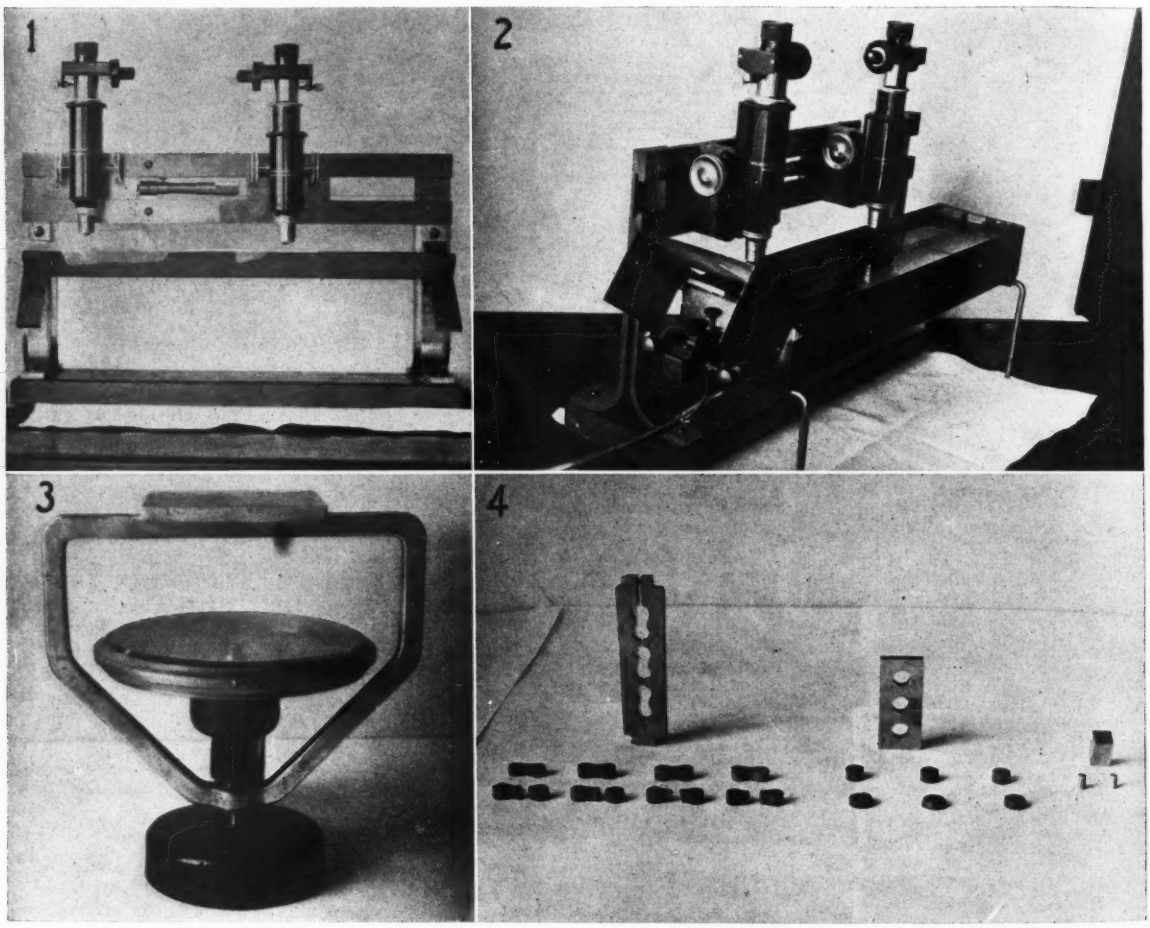


Fig. 1—Comparator microscope. This instrument is used for determining the setting expansion of plaster, artificial stones, investments, and similar substances. Tests are made on mixes of weighed proportions and spatulation time, and on hit-or-miss mixes. Spatulation is accurately timed by the stop-watch.

Fig. 2—Same instrument with the water bath attachment, which contains an electric heater and control, by means of which, change in temperature may be made to one fifth of a degree. The control equipment is shown on the left. A close inspection will disclose the index plate under the right microscope. This apparatus is used for testing the thermal expansion of compounds and waxes.

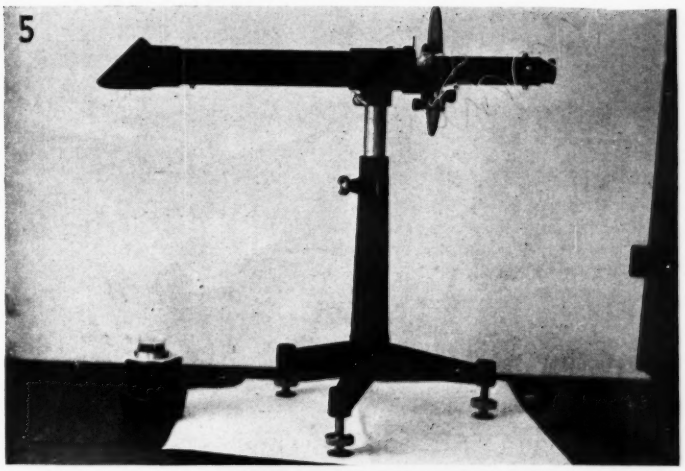
Fig. 3—Flow micrometer. This instrument is used to determine the flow, or change under pressure, of compounds, waxes, and amalgam. Definite weights are placed upon the platform, and the change is observed, after definite periods of time. In the case of the compounds and waxes, tests under water at different known temperatures are made. Amalgam specimen will be seen in instrument.

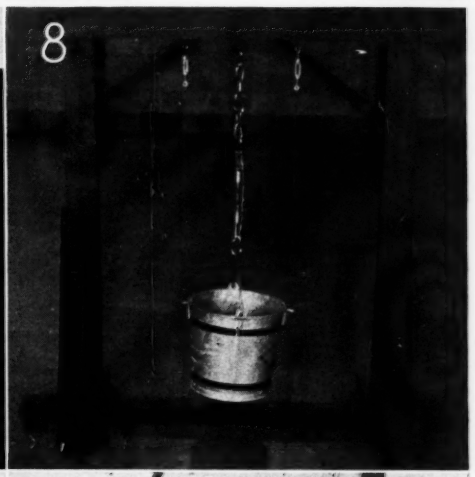
Fig. 4—Dies and specimens. At the left will be seen the die used in preparing specimens for the tensile test. A row of base plate wax, inlay casting wax, compound, and vulcanite specimens are shown and in front of each is a tested specimen. The center group are specimens of waxes and compound for the flow test and before each is a tested sample. The die is shown behind them. At the right are the die and specimens of amalgam for the flow test.

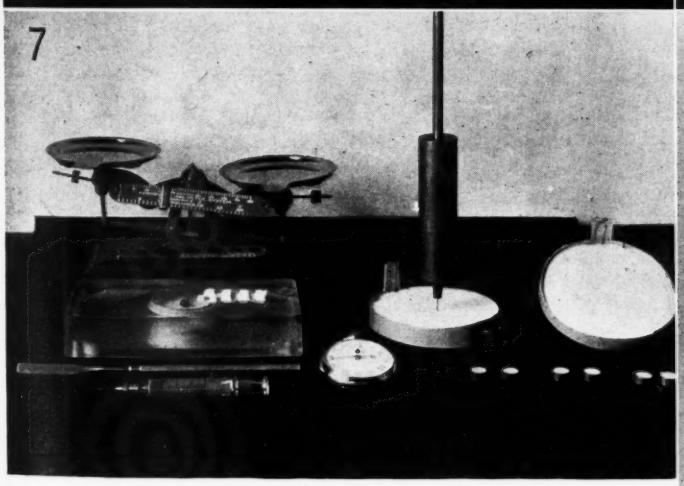
Fig. 5—The viewing apparatus used in connection with the Interferometer. A helium tube furnishes the light. A transformer and a resistor are part of the set-up. The Interferometer, seen under the forward end of the viewing apparatus, at the left, is composed of two planes, the upper one resting upon three pins of equal length, two of which are stationary, the other, formed by the specimen. The field shows a circle containing numerous striations, or fringes. In case of expansion, the number of fringes increases, while with contraction, the opposite obtains. Amalgam, cements, the silicates may be tested with this equipment.

Fig. 6—Instruments used for amalgam. The Interferometer is seen in the center of the upper row. The die and two specimens from it are shown at the lower left. Proportions are weighed on the balance. Trituration and mulling is definitely timed by the stop-watch. All specimens are carefully measured by the micrometer.

Fig. 7—Equipment used for cements and silicates. Proportions of powder are carefully weighed on the scale, and the liquid is measured by means of the syringe. A definite technique of incorporating the powder and liquid is followed and the time of mixing is governed by the stop-watch. Setting time is determined by means of the Gilmore needle (1 pound, 1/24 inch point). The mix is placed in a metal ring and the point of the needle is rested upon the material from time to time until it leaves no further impression. This technique is also followed for determining the setting time of plaster, investments, etc. At the right will be seen the needle resting upon a specimen of investment and in front of this several rings of cement. A close inspection of the investment will show the impressions of the needle point.







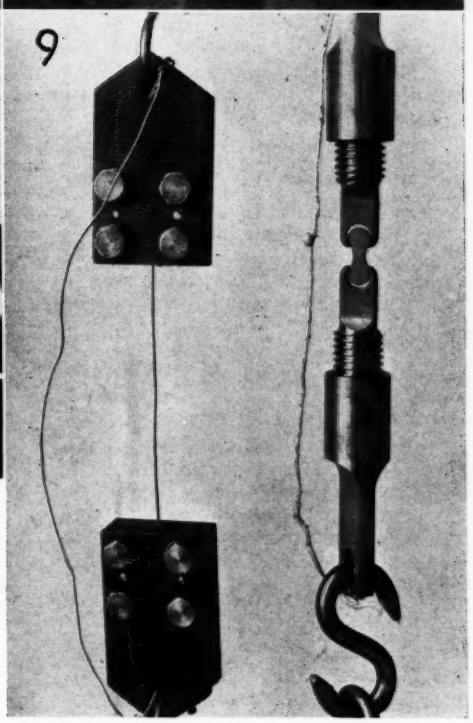


Fig. 8—Tensile test apparatus. A convenient form which can be moved to the laboratory from the store room. This apparatus is used for the tensile testing of compounds, waxes, wires, casting, etc. Lead shot is poured into the bucket until fracture, and is then weighed, from which tensile strength is computed to pounds per square inch. The wires alongside of the bucket keep it from upsetting.

Fig. 9—Clamps and specimens for the tensile test. The briquette clamps at the right are shown with a compound specimen between them. The wire clamps are shown at the left with a specimen of wire. These clamps are used with the tensile test apparatus shown above. The string shown connecting the two clamps of each type are used to prevent the lower clamp from dropping after fracture of the material and being mutilated.

extensive research. It has found that our materials act in the desired manner only when they are treated and manipulated in a definite way.

An investigation on the subject reveals the fact that few dentists have the proper knowledge of materials. Their understanding of the materials is gained only by experience in using them, and by following the instructions of the manufacturer, which are usually indefinite. The fault, of course, lies in the source of learning, the dental schools.

Because this fact was realized, a course in dental materials was instituted at the Georgetown University Dental School. This subject is presented in two ways: a lecture course and a laboratory course. The subject is given to freshmen because they have had no experience with dental materials, and hence have nothing to unlearn.

In the lecture course, and in the laboratory course, the subject is divided into two general classes: materials used in prosthetic dentistry, and those used in operative dentistry and crown and bridgework. Those used in the latter two departments are generally the same. The lectures, or the theory, and the laboratory work, or the practice, follow each other as closely as possible. Since the object of the course is to impart a knowledge of the materials and the manipulations, no work relating to dentistry is given.

Under the first class come lectures relating to the ingredients of the materials. The source, extraction, physical and chemical properties, and manufacture of each ingredient are explained. Formulas and proportions are given whenever possible. The relation of each ingredient to the whole mass is discussed. American Dental Association Specifications are given when they apply, and the uses and manipulations of the materials are explained. When the nonmetallic materials are completed, the metallic materials are studied under the department of metallurgy.

In the laboratory, the materials are studied under their individual classifications; that is, according to their uses. First of all, because of its common usages, plaster of Paris is studied. Then follows a study of the materials in the sequence of their appearance: (1) impression materials, under which are included modeling compound, and elastic compounds; (2) cast materials, such as the quick-setting gypsum compounds and artificial stones; (3) base plate materials and the denture base materials, under which are the resin base materials and vulcanite.

Under the second division, operative and crown and bridge materials, come waxes, investment materials, porcelain, and the cements.

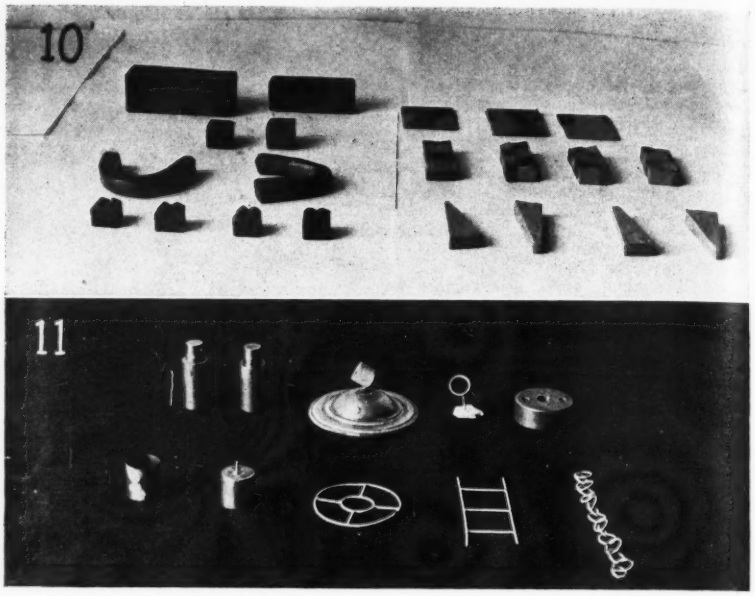


Fig. 10—Wax and vulcanite technique. At the left will be seen boxes, cubes, and "U's" of base plate wax, and in front of these, cubes of inlay casting wax with carved surfaces. Training is thus provided both with the material and with the instruments used with them. At the right will be seen wedges, blocks and plates of vulcanite, packed in one and two rubbers. The rear row of plates gives training in repair. The two center blocks in the center row, upon close inspection, will disclose porosity in the red rubber.

Fig. 11—Casting and soldering technique. The rear row shows the dies, inlay and crown type, and crown and ring castings, used in providing training in casting. These are made with and without expansion. The front row shows the soldering technique pieces which give excellent training in soldering and the use of the necessary instruments.

Experiments consist of the use of the testing equipment and the construction of technical pieces. Plasters, investments, and like materials are tested for setting expansion, temperature developed, setting time, and strength. Several mixes of varying proportions are made, and the mix showing the best results is selected as the standard. The students prepare several blocks of known shapes and sizes. Impression materials are tested for thermal expansion, tensile strength, and flow at various temperatures. Impressions are taken from dies, and casts are poured. Similar tests, that is, thermal expansion, tensile, and flow tests, are made for wax. For technique, boxes and U-shaped boxes are made. Inlay wax cubes are carved with pyramids on one surface. With vulcanite, experiments are made for the tensile strength of various rubbers. Blocks and wedges of given dimensions are made, some packed with one rubber only, others with two rubbers. Training is given in vulcanizing and experiments are done leading to an understanding of porosity and means of overcoming it. A thin square is packed in two rubbers, which is later repaired.

Inlays are cast from patterns made of dies, both the inlay type and the crown type. Inlays, rings, and crowns are made, each with the required expansion. Soldering technique is given by requiring the construction of five pieces, made from wires: a tube, a tube and cap, a ladder, a wheel-spokes-and-wheel, and a chain. Three solders are used. Cements, both zinc oxyphosphates and silicates, are next studied. Tests are made for expansion, setting time, temperature developed, and strength. Definite proportions are used.

Amalgam is studied for expansion or contraction, flow and strength. Various mixes and proportions are made and their actions studied under the Interferometer. The manipulation that produces the desired result is accepted as the standard.

All proportions are definitely made, both by weight and volume. Scales and graduates are used. Time is accurately gauged by the watch. All factors, such as temperature and humidity, are made as constant as possible.

At the completion of this course, the student is equipped with a knowledge of the important materials with which he will work as a dentist. He knows what they are used for, and of what they should consist. He knows

how they should be used, and what will occur if they are not used correctly. He is trained in the proper manipulations of his "stock in trade." He is fully aware of the certain failures that will follow the mismanagement of his materials, because he has seen the proved fallacies of the wrong way. And finally he understands the methods by which materials are tested, so as to conform with definite standards.

It is my feeling that a course such as this should be a part of the curriculum of every dental school, for it imparts a knowledge that is of absolute necessity to the successful practice of dentistry.

206 Medical Science Building.

POSTOPERATIVE CANAL FILLING IN APICOECTOMY

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New York

WHILE the preoperative filling of a root canal is preferable in cases under consideration for apicoectomy, there are advantages in the procedure here described. When there is a vast destruction of bone beyond and around the apex of a badly infected tooth or teeth the operator may find it almost impossible to dry the canal long enough to warrant his reliance on making a sterile filling, uncontaminated by the seepage from the apical space. In such cases an apicoectomy is first recommended, and the root canal operation second. Many such operations, successfully performed, justify the belief that these operations produce equally favorable results, compared to those teeth that are filled prior to resection.

TECHNIQUE

1. The usual procedure of an apicoectomy is followed.
2. Instead of suturing the flap, the bone cavity is packed with plain gauze dipped in petrolatum incorporated with anesthesin, thymol iodide, and bismuth subgallate.
3. The patient is then referred to his dentist for the root canal filling.
4. This completed, the patient returns the same day for removal of the first dressing. The filling material showing through the canal at the resected surface is smoothed down, and another dressing of similar nature as the first is reintroduced.
5. The wound is now permitted to heal by granulation, just as any cystic cavity would be treated.

This procedure materially simplifies the operation, as it does not make the root filling operation by the dentist difficult. The operator proceeds swiftly and definitely to force his filling material up to the gauze in the bone cavity, and he does not have too much concern about the canal being made unsterile by apical seepage.

Fig. 1

Fig. 2

Fig. 1—Extensive periapical pathology before treatment.

Fig. 2—Roentgenogram showing root canal fillings.

730 Fifth Avenue.

THE DENTAL SCENE

(*Continued from page* 281)

find new values too—deep beneath them all there lies not only the current stress of circumstances, nor the accumulated hardships of a system, but the profound, eternal conflict between public opinion or feeling and individual enterprise. It is not only a matter of contending forces: progressive socialization and reactionary rugged individualism—these are emotional catchwords, frequently meaningless, which represent what happens when theories are reduced to phrases. There is, I feel, a deeper all-pervading turmoil which John Cooper Powys anticipated:

> We have to face the fact—bitter and melancholy though it may be—that in our great bourgeois-dominated democracies the majority of the people would like to trample out the flame of genius altogether; trample it out as something inimical to their peace . . .
>
> The clash is bound to come sooner or later between public opinion, concerned to preserve the comfort of its illusions, and the art of the individual artist playing, in noble irresponsibility, with all illusions . . .
>
> We shall be wise if, before we die, we learn a little of the art of suspending our judgment . . . The essence of us . . . is too rare and delicate a thing to bear the crude weight of these sturdy opinions, these vigorous convictions, these social ardours, without growing dulled and hardened . . .

One cannot help wondering how many of us will struggle through the turmoil to meet a changed and ever-changing civilization without having become "dulled and hardened"; with judgment suspended; without having become a disorganized and unadaptable *McTeague*; with the ability to "neutralize inconveniences and utilize advantages"; and above all, without having lost the individualist's sense of humor and quality to dream creations while contributing to socialized welfare. It is a far-away star we shoot at, I know. —E. H. D.

NECROSIS FOLLOWING INFILTRATION

DON E. WOODARD, D.D.S., M.S.D.
Kansas City, Missouri

THE selection of solutions for the proper induction of local or block anesthesia is often a problem for the dentist. Because of economic reasons, many dentists prepare their own solutions. Others prefer the homemade because of the variety of dosage that may be had. Those who do should bear in mind and accept the responsibility that this procedure involves. It must be conceded that the pharmaceutical houses with their expert staff of chemists and research men can produce a more stable and uniformly accurate solution. The chance of error on the part of the operator in the mixing of his solutions is always present and this case is herewith presented as a reminder that we must always be cautious and careful in our techniques.

REPORT OF CASE

Mrs. A. C., aged 33, presented to her dentist, May 16, 1933.

History—The following teeth were extracted: upper left second bicuspid and first molar, and upper right lateral incisor. The anesthetic used was a fresh solution prepared by the dentist.

Injections: Upper left side: (1) Infiltration over second bicuspid, (2) tuberosity and posterior palatine. For upper right lateral: Infiltration and anterior palatine.

The extraction was painful and the patient's face immediately began to swell until the eyes were closed; this was followed by a sloughing of the soft tissue of all injected areas.

Examination—May 21, 1933, at the time I saw the patient, examination revealed a well nourished white woman whose face was considerably swollen below the eyes to the upper lip and the area was hard and infiltrated; some scaling of the epithelial surfaces was present. The orbits were not involved. There was a perforation of the skin just below and lateral to the right ala about 1 cm. in diameter. Intra-orally there was considerable evidence of widespread necrosis of the soft tissue. One-half the palate on the left side from the posterior palatine foramen anteriorly was necrotic and covered with a grayish slough. Buccally to the ridge on the left side, the muco-buccal fold was destroyed from the cuspid to the tuberosity to a depth of from 4 to 6 cm. and was sloughing. On the right side the area from the bicuspid region to the median line of the muco-buccal fold was destroyed and there was sloughing to a depth of from 4 to 6 cm. There was a perforation through the lip in the region of the right ala. The patient had had a slight elevation of temperature. Her general physical condition was good.

The untouched photograph shows the condition of the patient on October 10, 1931. There is a contraction on the right side of the upper lip which was partly corrected by the plastic operation. However, the innervation to this part was destroyed and it is consequently not under the control of the patient. The pouchy appearance under the right eye is the localized osteitis of the infra-orbital ridge referred to in the article. Below this at the ala of the nose is the perforation through the face into the muco-buccal fold. The mucosa which eventually covered the palate, of course, was thin and of a difficult type to support a restoration. The depression noted in the left cheek is caused by the contraction of scar tissue and by the loss of a greater part of the areolar tissue of the cheek. This was built out to some extent by a cartilage implant. The cheek at the deepest portion was thin, and had a little more solution been injected, it would probably have been perforated.

Diagnosis and Prognosis—A diagnosis of necrosis following injection of some destructive agent was made. The prognosis was fair.

Treatment—Oxidizing irrigations, rest, and cleanliness of the affected areas were advised.

Investigation—Upon questioning the dentist the day following examination, I found that he kept his Ringer solution and also his temporary cement liquid in practically identical bottles and the only explanation he could offer was that he had accidentally used the temporary cement liquid instead of the Ringer solution. This is practically an unforgivable error and shows the possibilities of mistakes in preparing one's own solution. The dentist did not have any liability insurance and this mistake might have destroyed his practice. However, the patient was immediately sent to the hospital and placed under special care. The patient and her husband signed a release from suit in favor of the dentist, and in return they received the best of care at the dentist's expense.

Course—Treatments covered a period of five months. On or about the thirtieth day the muco-periosteum of the palate was stripped out, the bone being left exposed. This also occurred in the upper right cuspid and lateral region and the cortical layer of bone of the palate, and the anterior surface of the right maxilla sequestrated. A local osteitis developed on the mesial half of the infra-orbital ridge on the right side which necessitated extra-oral drainage.

October 31, 1933, the entire palate had completely healed and healthy granulations were present in the right lateral region which was mostly epithelialized. At this time a plastic operation was performed, a pedical flap being swung in from the cheek to close the perforation lateral to the ala. This patient, however, will carry to her grave the marks of this dentist's mistake.

1628 Professional Building.

Or Use Coupon on page 296.

The Publisher's Note Book

LIVING up to its policy, telling the story in pictures wherever possible, THE DENTAL DIGEST so far this year has published nearly 500 illustrations. Many more pages of type would be required to present the same information if the magazine were not so profusely illustrated—if the editor's blue pencil were not used to save the reader's time. THE DIGEST hopes never to publish thick issues.

* * * *

ALMOST every subscriber renewed for 1934—93.5 per cent to be exact. In publishing circles from 50 to 60 per cent renewal is considered an excellent showing. Thanks for continuing to like THE DIGEST.

* * * *

LAST month the first of the *new* series of full-color dental patient charts was published. Others are scheduled for early issues. The profession has already purchased about 7,000 copies of the booklet in which the first series was reprinted. Among readers who are commenting upon their use of the charts, one practitioner volunteers the information that $1,500 in fees resulted from showing patients the chart entitled "Why Construct A Bridge?"

The chart booklet is intended for use at the chair but in some cases an extra copy has been purchased for the reception room table.

And, speaking of reception room tables: more and more dentists are keeping professional magazines out of their reception rooms. Professional magazines, they realize, are confusing to laymen. A little knowledge is a dangerous thing. Professional papers are written for professional men. Occasionally dental journal articles *are* appropriate for lay reading. Many are finding it a good plan to clip these for reception room scrap-books.

* * * *

THE PRESENT publishers "inherited" about 500 unexpired subscriptions when the magazine was taken over two and a half years ago. Approximately one practicing dentist in every three is now a paid subscriber to THE DENTAL DIGEST. But the journal's circulation will always be limited by the number of dentists who are eager to increase their technical and scientific knowledge, since THE DIGEST is not intended to be amusing or entertaining.

MERWIN B. MASSOL, *Publisher.*